

HORTICULTURAL ABSTRACTS

INDEX TO

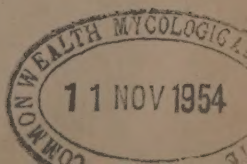
VOLUME XXIII



1953

Compiled and issued quarterly since 1931 by the
COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS
EAST MALLING, KENT, ENGLAND

EDITOR: D. AKENHEAD, O.B.E., M.A., B.Sc.



SUMMARY OF CONTENTS

	<i>Pages</i>
AUTHOR INDEX - - - - -	III
SUBJECT INDEX - - - - -	xxxv
PUBLICATIONS EXAMINED - - - - -	CXXXI
MISCELLANEOUS - - - - -	5, 216, 362, 552
TREE FRUITS, DECIDUOUS - - - - -	26, 227, 378, 564
SMALL FRUITS, VINES AND NUTS - - - - -	51, 238, 402, 580
PLANT PROTECTION OF DECIDUOUS FRUITS - - - - -	60, 242, 413, 587
WEEDS AND WEED CONTROL - - - - -	86, 261, 439, 606
VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE - - - - -	99, 270, 446, 612
TOBACCO - - - - -	127, 291, 474, 636
MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS - - - - -	133, 297, 480, 640
FLORICULTURE - - - - -	143, 304, 489, 647
SUB-TROPICAL FRUIT AND PLANTATION CROPS - - - - -	160, 313, 501, 657
TROPICAL FRUIT AND PLANTATION CROPS - - - - -	178, 326, 519, 667
NOTES ON BOOKS AND REPORTS - - - - -	201, 350, 538, 691

The Commonwealth Bureau of Horticulture and Plantation Crops

Its administration, links with the Commonwealth
and Scientific Staff, March 1953

The Bureau is one of a group of Bureaux and Institutes covering the following subjects: agricultural parasitology, animal breeding and genetics, animal health, animal nutrition, biological control, dairying, entomology, forestry, horticulture and plantation crops, mycology, pastures and field crops, plant breeding and genetics and soil science, organized under the:

EXECUTIVE COUNCIL COMMONWEALTH AGRICULTURAL BUREAUX

<i>Member</i>	<i>Representing</i>
DR. E. MARSDEN, C.M.G., C.B.E., M.C., M.I.E.E., F.R.S. (<i>Chairman</i>)	New Zealand
W. F. C. MORTON (<i>Vice-Chairman</i>)	Union of South Africa
C. H. M. WILCOX, M.A.	United Kingdom
LIEUT.-COLONEL J. G. ROBERTSON, B.S.A., F.R.S.A.	Canada
J. E. CUMMINS, M.Sc., F.R.I.C.	Australia
H.E. THE HIGH COMMISSIONER FOR INDIA	India
DR. S. D. MUZAFFAR, M.A., M.Sc., F.R.S.A.	Pakistan
J. A. KINSEY	Southern Rhodesia
H.E. THE HIGH COMMISSIONER FOR CEYLON	Ceylon
C. E. LAMBERT	Colonial Territories
SIR HERBERT HOWARD (<i>Secretary</i>) Farnham House, Farnham Royal, near Slough, Bucks.	

The Executive Council of the Commonwealth Agricultural Bureaux is a signatory to the Fair Copying Declaration, details of which can be obtained from the Royal Society, Burlington House, London, W.1.

COMMONWEALTH AGRICULTURAL BUREAUX LIAISON OFFICERS

United Kingdom:

A. B. BARTLETT, Ministry of Agriculture and Fisheries, 1/4 Cambridge Terrace, Regent's Park, London, N.W.1.

Canada:

H. L. TRUEMAN, B.S.A., Director, Administrative Services, Department of Agriculture, Ottawa, Ontario.

Australia:

W. IVES, M.Ec., A.I.C.A., Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, E. Melbourne, C.2, Victoria.

New Zealand:

N. A. MARRIS, M.Sc., Department of Scientific and Industrial Research, Wellington, C.1.

Union of South Africa:

Mr. S. POTGIETER, c/o Secretary for Agriculture, Agricultural Buildings, P.O. Vallis, Pretoria.

India:

SHRI K. R. DAMLE, I.C.S., Vice-President, Indian Council of Agricultural Research, Raisina Road, New Delhi.

Pakistan:

TASKHIR AHMAD, Ph.D.(Cantab.), Director, Department of Plant Protection, Government of Pakistan, Karachi.

Southern Rhodesia:

J. C. F. HOPKINS, D.Sc., A.I.C.T.A., Department of Research and Specialist Services, P.O. Box 100, Causeway.

Ceylon:

D. C. L. AMERASINGHE, B.A.(Hons.) (London), Assistant Secretary, Ministry of Agriculture and Food, Colombo.

Colonies:

SIR GEOFFREY CLAY, K.C.M.G., O.B.E., M.C., Agricultural Adviser to the Secretary of State for the Colonies, Colonial Office, Sanctuary Buildings, Great Smith Street, London, S.W.1.

Anglo-Egyptian Sudan:

THE CHIEF OF THE RESEARCH DIVISION, Department of Agriculture and Forests, Wad Medani.

Republic of Ireland:

S. M. BREATHNACH, Department of Agriculture, Dublin.

OFFICIAL CORRESPONDENTS OF THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

Aden Protectorate:

THE DIRECTOR OF AGRICULTURE.

Australia:

W. A. T. SUMMERVILLE, D.Sc., Director, Division of Plant Industry, Department of Agriculture and Stock, William Street, Brisbane, B.7, Queensland, and Mr. F. M. READ, Department of Agriculture, Melbourne, Victoria.

Bahamas:

THE COLONIAL SECRETARY, Nassau.

Barbados:

CULTIVATION OFFICER, Department of Science and Agriculture.

Basutoland:

DIRECTOR OF AGRICULTURE AND LIVESTOCK SERVICES, Department of Agriculture, Maseru.

Bechuanaland:

DIRECTOR OF AGRICULTURE, Department of Agriculture, Mafeking, Cape Province, South Africa.

Bermuda:

DIRECTOR OF AGRICULTURE, Agricultural Station, Paget East.

British Guiana:

DIRECTOR OF AGRICULTURE, Department of Agriculture, Georgetown.

British Honduras:

DIRECTOR OF AGRICULTURE, Department of Agriculture, P.O. Box 149, Belize.

Brunei:

THE STATE AGRICULTURAL OFFICER.

Canada:

CHIEF, Horticulture Division, Central Experimental Farm, Ottawa, Ontario.

Ceylon:

DIRECTOR OF AGRICULTURE, Department of Agriculture, Peradeniya.

Cyprus:

Mr. K. HAMBOULLAS, N.D.H., Agricultural Officer (Horticulture), Department of Agriculture, Nicosia.

Federation of Malaya:

DIRECTOR OF AGRICULTURE, Department of Agriculture, P.O. Box 1004, Kuala Lumpur.

Fiji:

Mr. B. E. V. PARHAM, O.B.E., Senior Agricultural Officer, Suva.

Gold Coast:

Mr. A. JONES, Assistant Director of Agriculture, Department of Agriculture, Cape Coast.

Hong Kong:

DIRECTOR OF AGRICULTURE, Forestry and Fisheries.

India:

THE AGRICULTURAL COMMISSIONER with the Government of India, Indian Council of Agricultural Research, Delhi.

Republic of Ireland:

Prof. G. O. SHERRARD, A.R.C.Sc.I., Albert Agricultural College, Glasnevin, Dublin.

Jamaica:

DIRECTOR OF AGRICULTURE, Department of Science and Agriculture, Kingston.

Kenya:

Mr. T. H. JACKSON, Dip. Hort., Agricultural Officer (Horticulture), Fruit Experiment Station, P.O. Molo, Kenya.

Leeward Islands:

Mr. W. E. BASSETT, M.B.E., Agricultural Superintendent, Montserrat.

Mauritius:

DEPUTY DIRECTOR OF AGRICULTURE, Reduit.

New Zealand:

Mr. A. M. W. GREIG, B.Sc., N.D.H., Director, Horticulture Division, Department of Agriculture, Vickers House, Woodward Street, Wellington.

Nigeria:

ASSISTANT INSPECTOR GENERAL OF AGRICULTURE (RESEARCH), c/o Legislative Buildings, Lagos.

North Borneo:

DIRECTOR OF AGRICULTURE, Jesselton.

Northern Rhodesia:

DIRECTOR OF AGRICULTURE, P.O. Box 208, Lusaka.

Nyasaland:

Mr. J. A. SANDYS, B.Sc., Experimental Station, Limbe.

Pakistan:

SYED MOHAMED IBRAHIM SHAH, Horticultural Adviser, Block No. 18/1 Pakistan Secretariat, Karachi.

Seychelles:

DIRECTOR OF AGRICULTURE, Department of Agriculture, Victoria, Mahe.

Sierra Leone:

THE HORTICULTURIST, Department of Agriculture, Freetown.

Somaliland:

DIRECTOR OF AGRICULTURE AND VETERINARY SERVICES, Hargeisa.

Southern Rhodesia:

Mr. C. N. HAYTER, Government Horticulturist, Department of Agriculture, Salisbury.

St. Helena:

THE AGRICULTURAL AND FORESTRY OFFICER.

Sudan:

DIRECTOR OF AGRICULTURE AND FORESTS, Khartoum.

Swaziland:

PRINCIPAL VETERINARY AND AGRICULTURAL OFFICER, Department of Agriculture, P.O. Box 21, Bremersdorp.

Tanganyika Territory:

SENIOR RESEARCH OFFICER, Coffee Research and Experimental Station, Lyamungu, P.O. Moshi.

Trinidad:

Dr. B. G. MONTERRIN, Chief Scientific Officer, Department of Agriculture.

Uganda:

THE SENIOR BOTANIST, Department of Agriculture, Kawanda.

Union of South Africa:

F. G. ANDERSEN, B.Sc., Ph.D., Chief Division of Horticulture, P.O. Box 994, Pretoria.

Windward Islands:

Grenada: SUPERINTENDENT OF AGRICULTURE, Department of Agriculture, St. George.

St. Lucia: AGRICULTURAL SUPERINTENDENT, Department of Agriculture, Castries.

St. Vincent: AGRICULTURAL SUPERINTENDENT, Department of Agriculture, Kingstown.

Zanzibar:

Mr. G. E. TIDBURY, Agricultural Officer.

SCIENTIFIC STAFF

Consultant Director	F. R. Tubbs, M.Sc., Ph.D.
Director	D. AKENHEAD, O.B.E., M.A., B.Sc.
Assistant Director	G. K. ARGLES, Dip. Hort. Wye, A.I.C.T.A.
Scientific Assistants	V. H. GOLDSCHMIDT, Ph.D. J. DUNDAS, B.Sc. Miss P. J. ROWE-DUTTON, B.Sc.Hort. Mrs. E. ULYATT, Dip. Hort. Eisgrub.

EDITORIAL NOTES

Subject Matter. Potatoes, Sweet potatoes, Sweet corn and others

So great has been the ever increasing pressure of literature on agricultural research, especially on horticulture and plantation crops, that we have gladly accepted the offer of our sister bureau of Pastures and Field Crops to take over some of the borderline crops.

As from 1953, potatoes, sweet potatoes and sweet corn will be found no longer in Horticultural Abstracts, but in Field Crop Abstracts [obtainable also from C.A.B., Farnham Royal, 45s. a volume]. Certain other crops such as Tobacco may possibly follow suit in future volumes, due notice being given of any such change.

Olives

Olives now find a more appropriate place in the sub-tropical section.

Annual Reports

These continue to offer almost insuperable obstacles to the intelligent abstractor. As from the present number an attempt is being made to sift the grain from the chaff and store the grain in the granary. In other words, important, specialized reports from such places as, say, Tea, Coffee or Fruit Research Institutes and specialized articles from the reports of Research Institutes and Agricultural Departments will be abstracted in Horticultural Abstracts in the section devoted to the particular subjects in question, e.g. Tropical Fruit and Plantation Crops, etc., while the general reports of Agricultural Departments or of such Institutes as deal with a number of subjects will be covered, as briefly as possible, sometimes by a list of subjects, sometimes by a note in the Notes on Reports section.

Our aim is increased accessibility of relevant information. We should welcome our readers' views on the changes.

Notation

We are adopting a slightly different and more commonly accepted method of indicating the number of a particular part of a journal, the pagination of which does not run consecutively through the volume.

Old method *Flor. Exch.*, 1951, **117**: 26: 9.

New method *Flor. Exch.*, 1951, **117** (26): 9.

Our method remains unaltered where the pagination is consecutive throughout or there is no volume number, e.g.

Fruits et Prim., 1952, **22**: 140-2.

Citrus Gr., 1952, No. 221, pp. 4-5.

13th INTERNATIONAL HORTICULTURAL CONGRESS HELD IN LONDON, 8-15 SEPTEMBER, 1952

A report of this Conference will be published by the Royal Horticultural Society, Vincent Square, London, S.W.1, about June, 1953. It will consist of two bound volumes, price £2 2s. plus 2s. 6d. for postage and packing. Orders should be sent to the Society.

By kind permission of the R.H.S. summaries or notes are given in this number of Horticultural Abstracts of all papers presented.* Readers are asked to bear in mind that these summaries are based on the mimeographed papers or summaries hastily prepared and made available at the time of the Congress and it has not been possible to check them carefully against the original papers.

The general or introductory papers are designated [Gen. Pap.] and, the full papers not having been seen, it is impossible to indicate their length. The approximate length [in mimeographed foolscap pages] of the other papers [Mim. Pap.] is, however, given. Where there is reason to suppose that only a summary will appear in the published Proceedings this is stated.

* Except one, "Potatoes in the Tropics" by K. S. Dodds and J. G. Hawkes.

HORTICULTURAL ABSTRACTS

Vol. XXIII

March 1953

No. 1

Initialled abstracts and reviews not by Bureau staff are by J. E. Goode, A. C. Mason, S. C. Pearce, and H. M. Tydeman of the East Malling Research Station, the staff of the Obstbauversuchsring, Jork, Germany [O.J.], L. Ogilvie of the N.A.A.S., G. StC. Feilden and H. Wormald.

INDEX OF CONTENTS.

	Nos.		Nos.
MISCELLANEOUS	Abstr. 120. Noted 40	WEEDS AND WEED CONTROL	Abstr. 112. Noted 16
General	1-7	General	548-554
Statistical design	8-10	Particular weeds	555-565
Breeding and varieties	11-22	Aquatic weeds	566-567
Climate and temperature	23-29	Control of trees and shrubs	568-578
Seed and seed treatment	30-35	Weed control in fruit crops	579-584
Biochemistry	36-43	Weed control in vegetables and various other crops	585-608
Physiology	44-65	Weed control in ornamentals and turf	609-619
Growth substances	66-76	Weed control in sugar cane	620-624
Radioactive materials	77-80	Herbicides	625-659
Nutrition	81-86	Noted	660a-660p
Soil management and irrigation	87-103		
Culture media	104-106	VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE	Abstr. 184. Noted 35
Glasshouse practice	107-115	General	661-846i
Practical devices	116-120	Abelmoschus	661-701
Noted	121a-122n	Asparagus	702
TREE FRUITS, DECIDUOUS	Abstr. 162. Noted 25	Brassicas	703-707
General	123-285y	Celery	708-723
Breeding and varieties	123-137	Cucurbits	724-730
Propagation and rootstocks	138-156	Legumes	731-740
Growth phenomena	157-163	Mushrooms	741-756
Pollination and fertility	164-177	Onions and related crops	757-767
Soil management, fertilizers and irrigation	178-187	Rhubarb	768-772
The use of growth substances	188-231	Root crops	773
Planting, training and pruning	232-246	Salad crops	774-787
Harvesting and marketing	247-256	Spinach	788-795
Storage	257-262	Tomatoes	796-800
Fruit composition	263-275	Noted	801-844
Processing	276-282		845a-846i
Noted	283-284		
	285a-285y	TOBACCO	Abstr. 42. Noted 11
SMALL FRUITS, VINES AND NUTS	Abstr. 70. Noted 19	General	847-889k
Small fruits	286-356s	Varieties and breeding	847-849
Vines	286-308	Growth phenomena	850-853
Nuts	309-345	Composition and metabolism	854-859
Noted	346-355	Cultural practice	860-865
	356a-356s	Diseases	866-868
PLANT PROTECTION OF DECIDUOUS FRUITS	Abstr. 190. Noted 23	Nematodes	869-884
General	357-547w	Curing	885-886
Disturbances of nutrition or unknown origin	357-358	Noted	887-888
Climatic and atmospheric factors	359-369		889a-889k
Viruses	370-396		
Bacteria	397-413	MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS	Abstr. 79. Noted 29
Fungi	414-415	Culinary and spice plants	890-970c
Nematodes	416-453	Drug plants	890-898
Mites	454-456	Essential oils	899-911
Insects	457-464	Fibres	912-918
Antibiotics	465-513	Hops	919-930
Fungicides	514-516	Insecticidal plants	931-943
Pest control methods and materials	517-519	Rubber plants	944
Spray application	520-533	Seed and other oils	945-955
Spray residues and damage	534-541	Tannins and dyes	956-961
Noted	542-546	Sundry plants	962-964
	547a-547w	Noted	965-968
			969a-970c

			Nos.			Nos.
FLORICULTURE	Abstr. 118.	Noted 35	971-1090i	Persimmons	1216-1217
General		971-984	Tung	1218-1219
Annual and herbaceous plants		985-1016	Noted	1220a-1220w
Bulbs, tubers, etc.		1017-1046			
Lawns		1047-1050	TROPICAL FRUIT AND PLANTATION CROPS		
Orchids		1051-1052	Abstr. 147.	Noted 40	1221-1369n
Succulents		1053-1060	General	1221-1232
Roses		1061-1064	Bananas	1233-1243
Other trees and shrubs		1065-1088	Cacao	1244-1259
Noted		1089a-1090i	Cinchona	1260
				Coconuts	1261-1265
SUB-TROPICAL FRUIT AND PLANTATION				Coffee	1266-1291
CROPS	Abstr. 129.	Noted 23	1091-1220w	Guavas	1292-1293
General		1091-1096	Mangoes	1294-1298
Avocadoes		1097-1102	Oil palms	1299-1300
Citrus—varieties, rootstocks and propa-				Pineapples	1301-1305
gation		1103-1112	Rubber trees	1306-1319
Citrus—growth and environment		1113-1122	Sugar cane	1320-1347
Citrus—cultivation and irrigation		1123-1129	Tea	1348-1364
Citrus—tree composition and nutrition		1130-1147	Sundry crops	1365-1367
Citrus—control of fruit set and drop		1148-1151	Noted	1368a-1369n
Citrus—diseases and pests		1152-1177			
Citrus—harvesting, packing, storing				NOTES ON BOOKS AND REPORTS		
and by-products		1178-1191	Abstr. 57.	Noted 9	1370-1427i
Dates		1192-1193	Books	1370-1388
Feijoas		1194	Annuals and reports	1389-1423
Litchis		1195-1196	New or revived periodicals	1424-1426
Macadamia nuts		1197	Noted	1427a-1427i
Olives		1198-1214			
Passion fruit		1215			

Total Abstracts 1,410. Noted 305.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

(See also 1379, 1389, 1391, 1395, 1396, 1400, 1402, 1413-1416, 1420, 1422, 1424, 1426, 1427d, e, f, g.)

1. DUCKHAM, A. N.

American agriculture: its background and its lessons.

[Publ.] *Minist. Agric. Lond.*, 1952, pp. 78, illus., maps, 2s. 6d.

This general survey by a former Agricultural Attaché at Washington contains information on the geographical and social background, rural organization and agricultural services, production techniques and farm organization and labour economy. Two pages only are devoted to horticulture as such.

2. KEMMER, E.

Institute der Fakultät für Landbau an der Technischen Universität Berlin-Charlottenburg. (Institutes of the agricultural faculty at the Technical University of Berlin-Charlottenburg.)

[Publ.] *Fak. Landb. techn. Univ. Berlin-Charlottenburg* 1952, pp. 42, illus.

After a short introductory page Professor Kemmer, who is Dean of the Faculty of Agriculture, gives pictures of the 16 agricultural and horticultural establishments in West Berlin which form the Agricultural Faculty of

the Technical University of Berlin-Charlottenburg. Those with a particularly horticultural bias are the Institutes which deal with Obstbau [fruit] under Professor Kemmer, Gemüsebau [vegetables] under Dr. H. Riethus, Blumen- und Zierpflanzenbau [ornamentals] under Dr. E. Böhnert, Gartenkunst und Landschaftsgestaltung [decorative and landscape gardening] under Professor G. Allinger, and Obst- u. Gemüseverwertung [fruit and vegetable processing] under Professor B. Drews. The Biologische Zentralanstalt für Land- und Forstwirtschaft is also shown.

3. WÄDENSWIL.

Zur 50-Jahr-Feier der Eidgenössischen Versuchsanstalt für Obst-, Wein- und Gartenbau Wädenswil. (The fiftieth anniversary of the Wädenswil Horticultural and Viticultural Research Station.)

Schweiz. Z. Obst- u. Weinb., 1952, 61: 321-56, illus.

This special, copiously illustrated number is entirely devoted to the jubilee of Wädenswil research station. It opens with an introduction by the Director of the Department of Agriculture and with an article on the history of the station by its Director, Dr. F. Kobel; these are followed by accounts of departmental work. The final paper reports on the close relations that exist between growers and staff.

4. GREY, C. H.

The Northern Horticultural Society.*J. roy. hort. Soc.*, 1952, 77: 314-20, illus.

An account is given of the establishment of the Northern Horticultural Station at Harrogate in 1949, and of the progress that has been made in its development. The ultimate aim is the establishment of "something in the nature of a Northern Wisley".

5. FOLLEY, R. R. W.

Economics and horticulture. I, II and III.*Fruitgrower*, 1952, No. 2951, pp. 95-6; No. 2955, pp. 268-9; and No. 2960, pp. 499-500.

A series of 3 short papers published under the headings: 1, The economists' relation to the industry; 2, An outline of a systematic research programme; and 3, Reconciling the ends to the means.

6. IVANOVSKAJA, A. A.

Increasing the root system of plants by grafting. [Russian.]*Doklady Akad. Nauk S.S.S.R.*, 1952, 82: 155-7, bibl. 6, illus.

Young potted seedlings of the bean variety Bomba (*Phaseolus vulgaris* var. *sphaericus albus*) were inarched onto the variety Lopata (*P. multiflorus* var. *albus* f. *arvensis*). When growth was resumed the variety Lopata was decapitated; only 4 out of 100 grafts did not take. Observations revealed that out of the 96 grafted plants 26 flowered later, 27 at the same time, and 43 a few days earlier than plants of the Bomba variety used as control. In addition to the expected enlargement of the root system, all the aerial parts, as also the yields of the experimental plants, were greater than those of the controls.

7. YARDENI, D., AND EVENARI, M.

The germination inhibiting, growth inhibiting and phytocidal effect of certain leaves and leaf extracts. [Spanish summary $\frac{1}{4}$ p.]*Phyton*, 1952, 2: 11-16, bibl. 8.

Germination of wheat seeds in petri dishes was inhibited by the ground leaves or leaf extracts of *Myrtus communis*, *Eucalyptus rostrata*, *Laurus nobilis* and *Pinus halepensis*, named in decreasing order of effectiveness. With *Myrtus*, 1 part leaves: 4 parts water was required to give complete inhibition; with *Pinus* even a concentration of 1: 2.5 did not give complete inhibition. Growth of tomato seedlings in soil was inhibited by fresh and dry leaves and leaf extracts of *Myrtus* and *Eucalyptus* and by dry *Eucalyptus* flower buds. The most striking results were obtained with the water extracts. Tomato seedlings placed in solutions containing extracts of the leaves of the 4 species were killed in 2-5 days, *Myrtus* being the most phytocidal and *Pinus* the least.—Hebrew Univ., Jerusalem.

Statistical design.

(See also 360, 1171.)

8. PEARCE, S. C.

Some new designs of Latin square type.*J. roy. statist. Soc.*, 1952, 14: 101-6, bibl. 6.

A study is made of certain designs of Latin square type, namely, Latin squares with (a) a column added, (b) a row and a column added, and (c) a column added and a row omitted. Recommendations are given for the

analysis of data by a method leading to an unbiased test. It is shown that sufficient randomization is obtained by writing down a possible configuration of plots and permuting rows and columns at random. [Author's summary.]—*E. Malling Res. Stat.*

9. HEALY, M. J. R.

The analysis of lattice designs when a variety is missing.*Emp. J. exp. Agric.*, 1952, 20: 220-6.

The analysis is presented of simple, triple, and balanced lattice designs where one variety or treatment is missing in all replications. The analysis uses intra-block information only. When the incomplete blocks are not very variable it is recommended that a randomized block analysis be used. [Author's summary.]

10. RICH, S.

Using half-tree plots for increasing the efficiency of fungicide tests.**Phytopathology*, 1952, 42: 353-4.

Trials on a plot of McIntosh apple trees showed that the use of half-tree plots does not lessen the amount of information concerning treatment differences, while it increases the number of treatments which can be tested. It gives a more reliable estimate of error because it is based on a greater number of degrees of freedom, and this allows for discriminating smaller differences between treatments. With care there is little chance of cross-tree contamination by spray drift. If spray drift is not important, this technique may be used to detect cross-tree influences caused by systemic effects.

Breeding and varieties.

(See also 975, 985-987, 1026, 1041, 1042, 1384.)

11.† MATHER, K.

The impact of genetical science on plant-breeding.*[Gen. Pap.] 13th int. hort. Congr.*, London, 1952, pp. ?

The study of the origins of our cultivated plants tell us where, among wild species, we should look for genetical material which may be valuable in bringing new properties into our cultivated forms; and it even shows us, now that polyploidy can be induced at will, how to set about making entirely new cultivated species which might fill gaps in our agricultural and horticultural economy. This last, however, is a field as yet little explored. New variation can be induced by the use of ionizing radiations, such as X-rays, and also by certain chemicals among which is mustard gas, but we still have no clue as to how to produce directed mutations, or even as to whether this is possible. We are coming, too, to understand the peculiar genetical relations that must exist between host and disease organism in such a way as markedly to facilitate breeding for disease resistance. Genetics can indeed do much for the plant breeder, but to realize the prospects it opens before us will require a great development of the applied science of plant breeding. Plant breeding is therefore likely to become more and more the work of the professional. [From author's summary.]

* See also *H.A.*, 22: 2046.

† See note, p. 3.

12.* WELLENSIEK, S. J.

The indirect service of genetics to breeding.

[Gen. Pap.] 13th int. hort. Congr., London, 1952, pp. ?

The indirect service of genetics to breeding is illustrated by a discussion of: 1. Mass selection versus pedigree selection, having similar effects for recessive characteristics, while the latter always is more effective for dominant characteristics. 2. The value of introducing vegetative reproduction as part of a breeding scheme. 3. The principle of generative testing, which is practised by selfing in self-fertile forms, by polycrossing in self-sterile forms. 4. The breeding of perennials, by returning to the original genotypes after generative testing. 5. The breeding of annual self-fertile forms, by inbreeding for several generations, followed by selection and testing. 6. The breeding of annual cross-fertilizers, by introducing vegetative reproduction, using parts of each clone for a polycross-test while the other parts are used for maintaining the genotypes either as vegetative clones, as seed of selfed clones, or as seed of pair crosses, as the case may be. 7. The general applicability of the method of repeated back crosses also in "difficult" cases, by making test selfings or polycrosses simultaneously with new back crosses. The conclusion can be drawn that breeding can make a wider use of genetical principles than it has done hitherto. In practice this means considerably more technical and administrative work for the breeder. However, horticultural breeding needs methods which lead as soon and as completely as possible to the goal. The practical application of the methods is much more complicated than simple schemes would lead one to expect. Genetics is the underlying principle. No two plants can be bred on exactly similar methods, and details for each separate plant have to be worked out. [From author's summary.]

13.* CAMP, W. H.

Intra-specific genetic diversity in nature; its importance to the breeder and grower.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 6.

In his experimental studies, the biosystematist is uncovering a wider modulus of genetically controlled intra-specific variation than has been suspected. These results are of considerable interest to the horticulturist, since they indicate that cultural failures sometimes may not be due so much to the inherent unfitness of the species involved as to the introduction of one of its biotypes unsuited to the conditions of trial. It is indicated by such widely divergent examples as the cultivated blueberries (*Vaccinium*) and beeches (*Fagus*) of both America and Europe that species, as taxonomically interpreted, often are genetically highly variable and that this variability may be considerably more pronounced in physiological reactions to different climatic and soil conditions than are the morphological manifestations of the variant forms. Since it is becoming increasingly more obvious that species are inherently more variable than we have heretofore supposed, it is pointed out that the modern plant explorer is more concerned with the finding, in the wild, of new gene combinations to enrich the "gene pools" of the species already in cultivation, than with the discovery of entirely new species. [Author's summary.]

* See note, p. 3.

14.* ALDERMAN, W. H., AND HUTCHINS, A. E.
Fruit and vegetable breeding in the United States.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 9, bibl. 19.

Fruit and vegetable breeding in the United States falls into two phases. Up to 1850, varieties arose mainly from selection and propagation of chance seedlings. The principal breeding method was mass selection. From 1850, breeding methods gradually changed. From 1850 to 1900, about 13% of new vegetable varieties resulted, seemingly, from controlled hybridization. From 1936 to 1952, about 80% originated by that method. Fruit breeding follows a similar trend. At first most varieties were produced by private growers. Seed companies and nurseries next became the principal originators. By 1900, public agencies began to play a part. Most varieties are produced now by public agencies, seed companies and nurseries. Striking evidence of results obtained lies in a partial enumeration of varieties originated. Since 1920, 980 fruit varieties have been introduced, 523 by public agencies and 457 by private breeders. In the same period, 51 nut varieties have been originated, 15 by public agencies and 36 by private breeders. Since 1935, at least 851 vegetable varieties have been developed, 387 by public agencies, 417 by private breeders and 47 of undetermined origin. [Authors' summary.]

15.* EMSWELLER, S. L.

Developments in plant breeding due to the use of colchicine.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 11, bibl. 24.

The effect of colchicine on plants is more complicated than is generally realized. Much of the material treated is now known to be chimeral, made up of diploid, tetraploid, and occasionally octoploid tissues. It is necessary, therefore, to make a thorough cytological check of all tissues of a plant before declaring it to be tetraploid. Unless this is done, a chimera with diploid hypodermis may appear to be a tetraploid and yet yield diploid progeny. A more difficult case is the one in *Lilium* where the anthers contained mixed tetraploid and diploid pollen mother cells and formed haploid and diploid pollen. They have so far yielded diploid progeny only, and without cytological checking could have been considered as a case of tetraploidy reverting to diploidy. [From author's summary.]

16. DE VILMORIN, R., AND CHOPINET, R.

Polyploidie expérimentale. Résultats acquis pour l'horticulture. (Experimental polyploidy. Results of interest to horticulture.)*Jardins Fr.*, 1952, 6: 153-66, bibl. 10, illus.

Some of the methods used and results obtained at the Laboratoires Vilmorin, Verrières-le-Buisson, France, in the production of polyploid plants are reviewed, and the horticultural value of these plants is estimated.

17. SCHWANITZ, F.

Züchtung und Pflanzenqualität. (Breeding and plant quality.)*Landw. Forschung*, 1952, 2. Sonderheft, pp. 3-17, bibl. 22, illus.

The author attaches great importance to the relationship

* See note, p. 3.

between large cell size and high quality. A chimaera of chard and a comparison of wild *Lycopersicum* spp. with *L. esculentum* are among the examples cited in support of this theory. [See also *H.A.*, 22: 2070.]

18. WELLENSIEK, S. J., AND OTHERS.

Vegetative seed formation?

Euphytica, 1952, 1: 123-9, bibl. 5, being
Publ. Lab. Tuinbouwgew., Wageningen 107,
1952.

"Von Tschermak's method of obtaining vegetative seed formation . . . by dusting the stigmas of emasculated flowers with . . . a growth substance or a vitamin was carefully tested with asparagus, spinach, cyclamen, apple, pear, tomato and brussels sprouts. The results are completely negative. Von Tschermak's results are ascribed to the fact that he did not protect his treated flowers from undesirable pollination."

19.* BANGA, O.

New varieties of fruits and vegetables introduced in Holland in recent years.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6.

A survey is made of new varieties of vegetables and fruits originated in the Netherlands since 1946. Sometimes old varieties may be re-discovered and be introduced as new ones. Sometimes a well selected reproduction of an existing variety is claimed as a new variety. It may also happen that something is introduced as a new variety which is actually not yet far enough developed to be so designated. This survey has therefore been restricted to those varieties which have been tested in respect of their newness and their relative purity, which can be properly identified, and have been accepted for filing in the official Netherlands Register of New Varieties which has existed from 1946 onwards. In addition to the name of a variety and that of its breeder, the number of the application and the year in which the application was filed are given, and also the origin of the variety. A full description of the varieties is omitted, but mostly their general type is indicated, and a differential diagnosis is added. For cultural value those interested should consult the Descriptive Lists of Vegetables and of Fruits which are periodically published in the Netherlands.

20.* KAJIURA, M.

New varieties of fruits, vegetables, and flowers introduced in Japan in recent years.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6.

After describing the procedure adopted in Japan for patenting new plants the author gives actual examples of plants patented in this way, including a navel orange, a persimmon, a radish, a pumpkin and a carnation.

21.* BREMER, A. H.

Norwegian vegetable and fruit varieties.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 4, bibl. 9.

An account is given of certain selected varieties of cabbage—which covers half the vegetable area in Norway—, beans, pickling cucumbers, tomatoes and peas. Fruit breeding work at Njøs and Brynes nursery is

briefly discussed. Fruit includes apples, pears, plums, strawberries and raspberries.

22.* KOBEL, F.

La création de nouvelles variétés de fruits et de légumes en Suisse durant les dernières années. (Recent production of new fruit and vegetable varieties in Switzerland.)

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 2.

Notes are given on recent new introductions by the Swiss Research Stations of strawberries, raspberries, cabbages, dwarf and runner beans, chicory, onions and tomatoes. Apples, pears and apricots also figure in the breeding programme.

Climate and temperature.

(See also 122g, 313-315, 370-396.)

23.* WENT, F. W.

Climate: its role and control in plant growth.

[*Gen. Pap.*] 13th int. hort. Congr., London, 1952, pp. ?

The various components of climate, temperature, day length, rain and wind, all strongly influence plants. It is pointed out that most plants grow best in fluctuating temperatures with a yearly and/or daily period. The yearly period we find in deciduous trees and bulbous or rhizomatous plants of temperate regions. These must usually be subjected to near freezing temperatures, if they are to develop the next season. Another type of response to fluctuating temperatures has been named thermoperiodicity. This is the response of plants to daily fluctuations in temperature. Most of our garden plants grow best when the night temperature is kept well below the day temperature. The control of climatic factors is usually achieved in greenhouses where temperature and humidity can be modified throughout day and night. Research has shown that, in the case of most plants, the effect of one or two of the climatic variables overshadows all the others; hence it becomes possible to modify the climate for certain plants by much simpler means than greenhouses. Horticulturists for centuries have made use of shading walls, pits, windbreaks, etc. . . . it is interesting to bring all these old methods under a modern scientific scrutiny. [From author's summary.]

24. BAUMANN, H.

Normen zur Erfassung des Witterungsablaufes im landwirtschaftlichen Versuchswesen und Erfassung der Beziehung zwischen Witterungsverlauf und Ernteertrag. (A standardized nomenclature of climatic factors in agricultural research and a formula expressing the relation between weather and yield.)

Ber. dtsch. Wetterdienst. U.S. Zone 32, 1952, pp. 95-7.

Suggestions for a standardized nomenclature of climatic factors to be used in agricultural experiments are available at the Institut für Acker- und Pflanzenbau der Humboldt-Universität, Berlin N4, Invalidenstrasse

* See note, p. 3.

* See note, p. 3.

42. The desirability of a formula expressing the correlation between weather and yields is emphasized.

25.* BLACKMAN, G. E.

An analysis of the effects of seasonal light intensity and temperature on the growth of plants in the vegetative phase.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 7.

The effects of shading on growth and development in the vegetative phase have been investigated by the methods of growth analysis. A reduction in the light intensity from daylight to 0.2 daylight causes closely similar changes in all the 16 species examined. On an approximately logarithmic scale the net assimilation rate is positively correlated with falling light intensity, but the leaf ratio (leaf area/total plant weight) is negatively correlated. Since these relationships characterize the relationship between light intensity and the relative growth rate it is possible to estimate the light intensity at which growth will be optimal; it ranges from 0.5 for the shade plant *Geum urbanum* to 2.51 daylight for *Medicago sativa*, with a group of species which grow best over the range of 0.7–1.0 daylight, e.g. *Lycopersicon esculentum*, *Vicia faba*. Shading increases the proportion of stem, decreases the root and has little effect on leaf weight, though it greatly affects the ratio of leaf area to leaf weight. All species exhibit these adaptive trends but to a different degree. A study of the growth of *Helianthus annuus* seedlings in consecutive weekly experiments between April and September over two seasons has shown that (a) the net assimilation rate is dependent only on the light energy (photons) received, (b) the leaf area ratio is determined by the light energy and the temperature and hence (c) the relative growth is also dependent on both light and temperature factors. On the basis of these and other findings, some aspects of the environment within and without a glasshouse at different periods of the year can be analysed with some precision, while the characteristics of plants which will grow best under glass can be defined. [Author's summary.]

26. SCHNELLE, F.

Über die Abhängigkeit der Laubverfärbung von der Temperatur. (The influence of temperature on autumn colouring.)

Ber. dtsh. Wetterdienst U.S. Zone 38, 1952, pp. 327-8, bibl. 1.

Observations at several meteorological stations in Western Germany suggest that the physiological processes leading to autumn colouring of foliage are induced by a decrease in daily mean temperatures to 11° or 10° C. and in minimum temperatures to 7° or 6° C.

27.* HOARE, E. R.

Temperature measurement with special reference to frost, steam sterilization and glass-house climates.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 8.

Temperature measurements are taken in a wide number of horticultural investigations and details are given of methods of ensuring that temperatures are recorded

correctly and that the temperature indicated is that of the object being investigated and not that only of the thermometer. The use of chromel-constantan thermocouples is outlined. Results obtained by such arrangements in investigating the problems of frost are then dealt with. The inversionary characteristics of air temperature with height are shown, together with the secondary inversion that incurs over an orchard caused by the tree foliage. The use of large revolving fans to overcome frost is dealt with and temperature characteristics are shown. It is found that a 30 ft. fan consuming 20 h.p. has increased the temperature by 1° C. over 1½ acres and it is probable that a 60 ft. fan consuming 20 h.p. would increase the temperature by a similar amount over 10 acres. Consideration is next given to the use of temperature measurement for the steam sterilizing of soil. The exact process of warming the soil is outlined and the specific heat and the amount of fuel to sterilize a given area is enumerated. It is found, for instance, that the specific heat of soil can be taken as 0.2 and allowing for the moisture content of soil a satisfactory method is obtained for deriving the quantity of heat required. Assuming reasonable efficiencies it is found that a minimum of 27 tons of coal is required to sterilize 1 acre of soil to a depth of 18 in. This figure can be greatly increased if the moisture content of the soil is high. Finally, apparatus is outlined for making temperature measurements in glasshouses and problems of averaging the temperature over a large volume and also in respect of time are dealt with. Details of the apparatus are shown but results from this apparatus are not considered in this paper because they relate largely to future work. [Author's summary.]

28. STEUBING, L.

Der Tau und seine Beeinflussung durch Windschutzanlagen. (Dew and the effect of windbreaks on its formation.)

Biol. Zbl., 1952, 71: 282-313, bibl. 34.

On windy nights hedges were found to increase dew formation by up to 200%, as compared with unsheltered areas. Air moisture was, moreover, higher and evaporation of the nightly dew was slower on the protected plot. Maximum dew formation occurred at a distance from the hedge corresponding to twice or three times its height. Weed associations in the zone of maximum dew formation differed from those in less favoured localities. The effects of soil cover and soil cultivation, as well as methods of dew measurement, are among the subjects discussed in detail.—Biol. Forschungsanstalt Hiddensee.

29. KREUTZ, W.

Neuere Erkenntnisse auf dem Gebiete des Windschutzes. (Recent observations on wind protection.)

Ber. dtsh. Wetterdienst. U.S. Zone 32, 1952, pp. 59-67, illus.

Windbreaks of reed mats, sunflowers and maize were used to study the effects of shelter on soil moisture, air temperature and evaporation and on various agricultural and vegetable crops, including paprika, dwarf beans and tobacco. Considerable increases in yield were noted in beans and paprika, in the latter largely owing to increased earliness on the sheltered plots. The shelter provided should neither be too high nor too dense.—Agrarmeteorol. Forschungsstelle, Giessen.

* See note, p. 3.

Seed and seed treatment.

(See also 121c, u, v, 672-682, 768, 974-976.)

30.* SALISBURY, Sir E. J.

Seed variation and its significance.[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 3.

Attention is called to the striking variation, both physiological and morphological, exhibited by the seeds of some species and the discontinuity of this variation in some instances. It is postulated that this may be of survival value in nature as increasing the range of dispersal but raises fundamental questions respecting natural selection. In the diminished competition of artificial cultivation small seeds appear not to be disadvantageous so that selection for higher yielding, smaller seeded types would seem justified. It is stressed that horticulturists have unrivalled opportunities of adding to our knowledge of heterogeneous seeds. [Author's summary.]

31.* BARTON, L. V.

Dormancy in seeds.[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 9, bibl. 20.

The term "dormancy" as used in this paper signifies the failure of viable seeds to germinate when they are placed under conditions of moisture and temperature which would ordinarily bring about sprouting. Dormancy may be due to an impermeable seed coat, a dormant embryo, or both. Seed coats may be made permeable by mechanical abrasion, soaking in concentrated sulphuric acid, or attack by micro-organisms in a moist medium at temperatures of 20° C. or above. Dormant embryos resume growth after exposure for different lengths of time to low temperatures (usually 1° to 10° C.). After-ripening at these low temperatures takes place only after the seeds have imbibed water. Thus when seeds combine impermeable coats with dormant embryos, the coat treatment must be given before the embryos can be affected by low temperatures. In certain instances the roots are not dormant, but the shoot, or the bud which forms it, is dormant and requires low-temperature pretreatment after the roots have formed. An extreme type of dormancy is to be found in seeds which require pretreatment in a moist medium at low temperature to after-ripen the root, followed by a period at high temperature (20° to 25° C.) to grow the root, a second period at low temperature to after-ripen the shoot, again followed by high temperature to permit the shoot to come through the soil. Physiologic dwarfs may be formed from non-after-ripened seeds. [Author's summary.]

32. MÜLLER, W.

Beiträge zur Nachreife und Lichtkeimung von Cruciferensamen. (On the after-ripening of cruciferous seeds and their germination in the light.)

Angew. Bot., 1952, 26: 181-90, bibl. 11.

Tests involving a large number of cruciferous species were carried out at Tübingen University from 1931 to 1933. The results are tabulated.

33. LEVARI, R., MAYER, A. M., AND EVENARI, M.

The effect of various metabolites on the action of some germination inhibitors.

Bull. Res. Coun. Israel, 1952, 2 (1): 27-36, bibl. 12.

* See note, p. 3.

The effect of some metabolites on the inhibitory action of 2,4-D and coumarin was investigated [using lettuce and wheat seeds]. It was found that the carbohydrates had little effect on the action of these inhibitors. A number of amino acids (glutamic and aspartic acid and ornithine) were shown to be able to increase the inhibitory action of 2,4-D, while cystine was able to reduce it. Coumarin was not affected by amino acids apart from a stimulating effect of β alanine. As a result of the observations obtained in this work, a theory is suggested by which the action of 2,4-D is related to substrate accumulation and the resultant poisoning of certain enzymes. The effect of the metabolites is also related to this phenomenon. It is suggested that the metabolic process particularly affected in the germinating seed by 2,4-D is the resynthesis of proteins from the breakdown products of existing reserve materials. Coumarin has been shown to act differently and on different metabolic paths from 2,4-D. [Authors' synopsis.]—Dep. Bot., Hebrew Univ., Jerusalem.

34. MINISTER OF AGRICULTURE FOR CANADA.

Diagnosis and control of seed-borne bacterial diseases.*A.R. Canada Minist. Agric. for 1950/51*, 1951, p. 34.

A serious obstacle in the production of disease-free seed has been the lack of adequate means of detecting pathogenic bacteria within the seed. A laboratory method of seed examination has been developed. It has been applied to the diagnosis of bacterial blight in beans but its application to other seed-borne bacterial diseases appears quite possible. A brief description is given of the method, which involves the use of bacterial viruses specific for the organisms.

35. MUNN, M. T.

Handling treated seed samples.*Seed World*, 1952, 71 (2): 14, 19, illus.

A note is given on the method used by the New York Seed Laboratory, Geneva, for minimizing the risk to workers during the handling or analysis of seeds treated with poisonous dusts. A Signal V-510 Challenger Vent Fan is used to draw all loose dust and fumes downwards away from the faces of the workers and into a discharge tube.

Biochemistry.

(See also 121j, 122 l.)

36. MASON, A. C.

The determination of small amounts of calcium in plant material.

Analyst, 1952, 77: 529-33, bibl. 4.

Treatment for the removal of interfering phosphate ions has improved the method described earlier [see *H.A.*, 21: 2208]. As little as 10 μ g. Ca can be determined accurately.—East Malling Res. Stat.

37. RAMÍREZ-MUÑOZ, J.

Nomógrafo y reglas de cálculo para el análisis espectral cuantitativo de elementos traza. (The use of a nomograph and slide rules in quantitative spectrographic analysis of trace elements.) [English summary $\frac{1}{2}$ p.] *An. Edaf. Fis. veg. Madrid*, 1952, 11: 267-81, bibl. 5, illus.

The method described facilitates the photometric calculations for quantitative spectrographic analysis of trace elements in biological materials and soils, using the step sector method.

38. LISICYN, D. I.

Labile glucosides in the disintegration processes in leaves. [Russian.]

Biokhimiya, 1952, 17: 443-5, bibl. 10.

Analyses were made of leaves of lilac (*Syringa vulgaris*) and ash (*Fraxinus excelsior*) that had been kept in the dark for different periods. In lilac the amount of l-glucosides was significantly reduced as the period of darkness was extended, while that of saccharoses decreased less, and in most cases showed no reduction of monoses. The data indicate that l-glucosides play an important part in the activity of carbohydrates in relation to the respiratory processes.

39. GUSTAFSON, F. G., AND COOKE, A. R.

Oxidation of ascorbic acid to dehydroascorbic acid at low temperatures.

Science, 1952, 116: 234, bibl. 1.

It has been found that when plant material such as tomato leaves is stored at -20°C . all, or nearly all, ascorbic acid present becomes oxidized to dehydroascorbic acid within a few days. This contrasts with the slow oxidation reported for orange juice stored at 2°C .

40. TOMBESI, L., AND OTHERS.

Attività ossidasica, catalasica, carboanidrasica, perossidasi e contenuto in glutathione ridotto ed acido ascorbico nel corso della maturazione di frutti e semi. Nota I. (Oxidase, catalase, carboanhydrase and peroxidase activity and content of reduced glutathione and ascorbic acid during ripening of fruits and seeds. Note I.) [English summary 1½ p.]

Ann. Sper. agrar., 1952, 6: 857-74, bibl. 10.

The biochemical processes of synthesis that occur in seeds and fruits during development were studied at the Stazione Chimico-Agraria Sperimentale, Rome, in a series of experiments with (1) *Phaseolus vulgaris* seeds (protein synthesis), (2) *Ricinus communis* seeds (fat synthesis), (3) *Triticum vulgare* fruits (sugar synthesis) and (4) *Solanum lycopersicum* fruits (carotenoid pigment). In (1) ascorbic acid disappeared during ripening; catalase declined to a minimum and then tended to rise; in the phase of maximum synthesis all the compounds associated with respiration reached a minimum content; oxidase and carboanhydrase were inversely proportional. In (2) seeds from plants raised in dry conditions matured early and synthesized a greater amount of fats; ascorbic acid and peroxidase disappeared with maturation; oxidase diminished sharply at first; catalase tended to increase constantly. In (3) ascorbic acid disappeared during synthesis; catalase decreased at first and remained at a minimum during the wax phase; respiration was at a minimum at the end of the milky phase; N fertilizers increased catalase activity and caused respiration and the reducing compounds to diminish. In (4) oxidase content fell during the yellowing stage, during which catalase reached a maximum; carboanhydrase, ascorbic acid and glutathione content increased up to ripening; oxidase and carboanhydrase

were in inverse proportion. The manufacture of lycopene in the tomato was also studied.

41. TOMBESI, L., AND VENEZIAN, M. E.

Attività ossidasica, catalasica e carboanidrasica e contenuto in glutathione ossidato/ridotto in relazione alla simbiosi batterica delle leguminose. Nota II. (Oxidase, catalase and carboanhydrase activity and content of oxidized and reduced glutathione in relation to bacterial symbiosis in the Leguminosae.) [English summary ½ p.]

Ann. Sper. agrar., 1952, 6: 481-97, bibl. 7, illus.

The variations and the correlation existing between oxidase, carboanhydrase and catalase activity and content of oxidized and reduced glutathione were studied in the leaf tissues and root nodules of *Vicia faba*. In the leaf tissue carboanhydrase activity is directly proportional to the oxidized glutathione content. During the breakdown phase of the bacterial form of *Bacterium radicicola*, oxidase activity is at its maximum, oxidized glutathione is absent and carboanhydrase activity diminishes. Oxidase and catalase activity are in direct proportion to one another. The content of carboanhydrase in the nodules was in direct proportion to that of catalase; oxidase activity tended to increase with the progress of symbiosis, whereas catalase activity diminished; oxidized glutathione increased towards the end of the biological cycle.

42. GODNEV, T. N., AND TERENTJEVA, M. V.

The chlorophyll content of buds of woody plants in winter and spring. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 83: 481-4, bibl. 4.

The chlorophyll a and b, carotene and xanthophyll contents of buds of several tree species and lilac were higher in spring than in winter. The proportion of chlorophyll a to chlorophyll b in dormant buds and buds ready to unfold was, however, nearly constant, and was almost the same as in fully developed leaves in the summer. A similar constancy was found in the proportion of xanthophyll to carotene, and the proportion of green to yellow pigments was also nearly constant. If, as is generally recognized, chlorophyll b is formed from chlorophyll a, then this transition, under normal conditions, starts directly the first molecules of chlorophyll a appear in the plastids, and continues at an approximately proportionate rate as chlorophyll a is formed.

43. IOFFE, M. D.

The presence of chlorophyll in the endosperm of cruciferous plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82: 473-6, bibl. 5, illus.

The plants examined in detail and illustrated were radish (*Raphanus sativus* var. *radicula*) and stock [*Matthiola* sp.], representatives of other genera being mentioned cursorily. It is concluded that the presence of chloroplasts in the endosperm of cruciferous plants has a pronounced physiological significance, for they arise at a relatively early period in the development of the seed and accumulate in tissues where there is particularly intense metabolism, i.e. the chalazal and the micropylar regions.

Physiology.

(See also 121h, i, m, 122b, c, k, n, 731, 732, 1054-1059, 1114.)

44. SOCIETY FOR EXPERIMENTAL BIOLOGY.
Symposia of the Society for Experimental Biology V. Carbon dioxide fixation and photosynthesis.

Cambridge University Press, 1951, 10×6½ in., pp. 342, bibls. numerous, illus., 42s.

This number contains papers read by some of the leading authorities at the symposium held at Sheffield in 1950. The papers are mainly concerned with pure botany.

45. SOCIETY FOR EXPERIMENTAL BIOLOGY.
Symposia of the Society for Experimental Biology. VI. Structural aspects of cell physiology.

Cambridge University Press, 1952, 10×6½ in., pp. 357, bibls. numerous, illus., 45s.

The following papers, read at the symposium held at Bristol in 1951, will be of interest to readers of *Horticultural Abstracts*: "Structure of root meristem cells of *Vicia faba*", by J. Chayen; "Growth of plant cell walls", by A. Frey-Wyssling; "The mechanism of plant cell growth", by R. Brown, W. S. Reith and E. Robinson.

- 46.* MITCHELL, J. W.
Changes in the growth and development of horticultural plants induced by growth-modifying chemicals.

[Gen. Pap.] 13th int. hort. Congr., London, 1952, pp. ?

Plant growth-modifying substances induce changes in the structural pattern or in the behaviour of plants as the result of basic growth responses at a cellular level. Plant cells, depending on their stage of development, vary in their sensitivity to these substances. Cells in different parts of the plant also vary in the way they respond. Some plant regulators induce characteristic cellular responses when applied to such crop plants as bean and tomato. Besides compounds that accelerate bud growth such as ethylene chlorohydrin and some thiocyanates, others such as naphtha are being used experimentally to suppress apical dominance in some kinds of plant and thus induce growth of lateral buds. Some growth-modifying compounds have been used to accelerate the growth of tomato, lemon, grape and blackberry fruits and to hasten ripening of fruits such as apples and peaches. Retardation and suppression of vegetative growth have been accomplished recently by means of newly discovered plant regulators related to carbamates, and maturation of some crop plants has been delayed by the use of these and compounds of the phenoxy type. These effects of growth-modifying substances and their use in controlling flower initiation by crop plants are evaluated. [Author's summary.]

- 47.* CHOUARD, P.
Environmental factors and growth regulating mechanisms in horticultural plants.

[Gen. Pap.] 13th int. hort. Congr., London, 1952, pp. ?

We may think of the development and growth of plants as being governed by a complex set of mechanisms.

* See note, p. 3.

Each one of these mechanisms interferes to a greater or less extent with the others and each can show a high, low or nil coefficient of action. The possession of a given set of regulatory mechanisms, each with its own coefficient, is the result of hereditary determinism: thus a species or variety is just as well defined by this physiological characterization as by the ordinary descriptive visual characters. Generally speaking and contrary to what is often believed, genetic determinism of each physiological mechanism is to a greater or less extent widely independent, so that in practice all or nearly all combinations of regulatory mechanisms can be found. This results in the extreme diversity of the response of different plants to environmental factors. Examples are given of typical phenomena with special reference to the following regulatory mechanisms: Vernalization, photoperiodism, thermoperiodism, dormancy in seeds, in shoots, etc. In some cases these mechanisms are absolute, in others they have only a "particular" or "limited" value. Many horticultural plants show these mechanisms in more or less attenuated degree corresponding to their ecological and cultural adaptability. But a knowledge of the complex of mechanisms possessed by each species and variety made clear by an intimate analysis of these mechanisms in the more significant cases of absolute reactions, shown particularly in wild plants, allows a more exact understanding of the cultural needs of the plant and of how to bring it to the required state of perfection at the time desired. There are few examples of more intimate association between physiology and practical horticulture.

48. CLENDENNING, K. A., WAYGOOD, E. R., AND WEINBERGER, P.

The carboxylases of leaves and their role in photosynthesis.

Canad. J. Bot., 1952, 30: 395-409, bibl. 41, being N.R.C. 2756.

"Malic" enzyme isolated from the cytoplasm of parsley and sugar beet leaves was linked with illuminated spinach chloroplast fragments to effect photosynthesis *in vitro*. [From authors' abstract.]-National Research Laboratories, Ottawa.

49. DUGGER, W. M.

The permeability of non-stomate leaf epidermis to carbon dioxide.

Plant Physiol., 1952, 27: 489-99, bibl. 17, illus.

The results of the study indicate that the non-stomate cutinized epidermis of leaves of both hydrangea and coleus are permeable to gaseous CO₂. The degree of permeability of the epidermal layer of hydrangea to CO₂ is proportional to the partial pressure of the gas above the epidermis. This correlation was not observed for the epidermis of coleus. There was more penetration, however, through coleus epidermis at 10% CO₂ than at 1% and 5%. Carbon dioxide at the higher concentrations reduced fixation of carbon in hydrangea leaves when the stomate epidermis was exposed to the gas. This effect is probably linked with the toxic action of a high concentration of CO₂ on the photosynthetic mechanism. At 1% CO₂, the amount of CO₂ gas penetrating the non-stomate epidermis of coleus is equal to the amount entering the leaf when the stomate side is exposed. The results indicate that light does not

influence the permeability of the leaf epidermis to CO₂. [From author's summary.]—Univ. Md.

50. HEATH, O. V. S.

Studies in stomatal behaviour. II. The role of starch in the light response of stomata. Part 2. The light response of stomata of *Allium cepa* L., together with some preliminary observations on the temperature response. *New Phytol.*, 1952, 51: 30-47, bibl. 24, illus.

Earlier observations that the stomatal guard cells of the onion (*Allium cepa* L.) contain neither chloroplasts nor any visible quantity of starch are confirmed, both for open and closed stomata. Porometer experiments have shown a real stomatal response to changes of light intensity, which cannot be accounted for by changes in leaf temperature, infra-red radiation, saturation deficit, soil moisture, or as due to a diurnal rhythm. In this species at least, therefore, a starch \longleftrightarrow sugar mechanism for the light response is definitely disproved; whether the hydrolysis of some soluble polysaccharide is concerned has not yet been investigated. Porometer experiments have shown considerable closing in response to increased temperature on the part of onion stomata, which is of a different order of magnitude from the expected errors due to difference of temperature between the leaf and standard capillary resistance. The light response thus occurs in spite of, rather than because of, the rise of leaf temperature associated with increased light intensity. An hypothesis depending on assumed sensitivity of the guard cells of onion to small changes of CO₂ tension (as in wheat and *Pelargonium*) is put forward to account for these temperature effects and also for the remarkable time lag shown in the light response on illumination after prolonged darkness. An alternative hypothesis to account for the temperature effects in terms of water loss is also mentioned. [From author's summary.]—Imp. Coll. Sci. Technol., London.

51. TORREY, J. G.

Effects of light on elongation and branching in pea roots. *Plant Physiol.*, 1952, 27: 591-602, bibl. 21, illus.

Root elongation and lateral root formation in pea seedlings and isolated pea roots grown in a nutrient medium were studied under various conditions of artificial illumination. In seedlings, removal of the shoot has no effect on lateral root initiation, whereas excision of the cotyledons stops lateral root formation under all light conditions. Maximum root elongation and lateral root formation occur when roots are maintained in the dark. White light apparently inactivates substances moving from the cotyledons which are essential for lateral root formation. Excised roots with an attached cotyledon require continuous illumination or short exposure to light daily, effectively to prevent lateral root initiation. Lateral root formation induced in cultured isolated roots by decapitation can be inhibited by a single short exposure to white light. By the use of gelatin filters, it was shown that red light inhibits lateral root formation much more effectively than filtered blue or green light. It is suggested that substances other than auxin are inactivated within the primary root by illumination. [Author's summary.]—Univ. Calif.

52.* CHOUARD, P.

Le contrôle du photopériodisme dans la pratique horticole. (The control of photoperiodicity in horticultural practice.) [English summary ½ p.] [*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10.

Very frequently horticulturists not only neglect to use facilities provided by photoperiodism for growing plants more easily, but they are even more ignorant of processes which can more or less modify the reaction of the plant to photoperiodism. The reaction is more or less controlled in the different species by previous vernalization treatments, or by day or night temperature, or by age, or size of the plants. Among the same group of plants are different varieties which show the greatest differences in reaction to photoperiodism, and genetics may combine these properties with others. Some examples are given in which the duration of light, the process of lighting or darkening, are fundamental technical means of forcing or of delaying the plant; but they must be associated with other physiological processes controlling photoperiodicity itself. [Author's summary.]

53. Roodenburg, J. W. M.

The influence of day-length on the health of plants.

Tijdschr. Plziekt., 1952, 58: 240-2, bibl. 4.

The following cases are cited as showing that an unhealthy condition of plants may be due to an unsuitable photoperiod: (1) Strawberries forced by long day treatment in November produced few flowers and discoloured leaves which became attacked by *Botrytis* and died off; when the plants were prevented from entering the winter rest period by illumination in September they remained quite healthy. (2) Winter-flowering begonias died off during winter without forming proper tubers unless they were given weak illumination during the night. (3) Damping off of seedlings of *Sinapis chinensis*, begonia and gloxinia was prevented by very weak illumination at night. The possibility that this may be due to a hormonal effect is discussed.

54.* BORTHWICK, H. A., AND PARKER, M. W.
Light in relation to flowering and vegetative development.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 9, bibl. 17.

This paper is concerned with some practical problems in the regulation of flowering by use of supplemental artificial light. The first part discusses the relative merits of radiation from fluorescent and incandescent-filament lamps used to promote flowering of sugar beet and other long-day plants, and the second part is concerned with the effectiveness of dark-period interruption for control of flowering and certain vegetative expressions of strawberry. Garden beet and *Hyoscyamus* were like sugar beet in that they were more responsive to incandescent-filament than to fluorescent radiation. It is suggested that the ineffectiveness of fluorescent relative to incandescent-filament radiation results from insufficient energy in the red wave lengths.

Regulation of flowering and of expression of several vegetative responses of strawberry were found to result

* See note, p. 3.

from interruption of the dark period with relatively low energies of artificial light. The data show that regulation of vegetative responses such as petiole elongation, leaf enlargement and runner formation depend on length of dark period rather than length of photoperiod. Six commercially grown varieties of strawberry used extensively in Eastern United States were similar in basic responses to photoperiod. [Authors' summary.]

55. ZIERIACKS, H.

Über Blüteninduktion durch Keim- und Primärblätter. (Flower induction by cotyledons and primary leaves.)

Biol. Zbl., 1952, 71: 210-38, bibl. 37, illus.

Young plants of 11 species (from 10 genera) were stripped of their leaves as they were formed, with the exception of one or both cotyledons, and were given photoperiodic treatment. The conclusion drawn from these experiments is that the transmission of the photoperiodic stimulus for flower induction requires a minimum leaf area which appears to vary with the plant species. With most of the plants tested the critical value was smaller than the area of the cotyledons—*Sinapis alba* flowered with only one cotyledon left, while *Kalanchoë blossfeldiana* required a primary leaf area of 100 mm². Primary leaves were also necessary for *Rudbeckia bicolor*.—Göttingen University.

56. BAILEY, L. F., ROTHACHER, J. S., AND CUMMINGS, W. H.

A critical study of the cobalt chloride method of measuring transpiration.

Plant Physiol., 1952, 27: 563-74, bibl. 13, illus., being *Res. Pap. J. Ser. Univ. Ark.* 1026.

The major objective of the present study was to determine whether a cobalt chloride technique could be used to measure absolute rates of transpiration in a quantitative manner, with a view to possible application of the method in field studies. Gravimetric water loss from small potted plants was adopted as the standard of comparison for cobalt chloride determinations. Experiments were designed with particular attention to the requirements for adequate sampling with cobalt chloride tests and to statistical evaluation of the results obtained. Plants used in the tests were tobacco, geranium, tomato, black oak, and white oak. The results of five transpiration experiments show clearly that quantitative data can be obtained with the cobalt chloride procedure, but these data show no consistent relationship with gravimetric observations. The cobalt chloride technique apparently measures some unidentified determinant of the transpiration process which can vary independently of the total moisture loss as measured gravimetrically. Potted plants which appear quite similar may differ significantly in their transpiration rates as measured gravimetrically. Cobalt chloride tests on different leaves show a high order of variability. [From authors' summary.]

57. KENDALL, W. A.

The effect of intermittently varied petiole temperature on carbohydrate translocation from bean leaves.

Plant Physiol., 1952, 27: 631-3, bibl. 1, being *Pap. Dep. Bot. Plant Path. Ohio St. Univ.* 541.

The effect of constant petiole temperature on carbohydrate translocation had been studied earlier [see

H.A., 22: 32]. In order to study the effect of variable conditions such as are found in the field, these studies were extended to include the following temperature treatments: (a) high day (40° C.) and moderately high night (25° C.) temperatures, (b) moderately high day (25° C.) and low night (5° C.) temperatures, and (c) constant moderately high (25° C.) day and night temperatures. In general the greatest amount of translocation, as measured by stem elongation, occurred through petioles maintained constantly at 25° C. The smallest amount occurred through petioles subjected to variation between 25° and 5° C. Alternating low and medium petiole temperatures had a greater retarding effect on translocation than constant low temperatures, whereas alternating high and medium temperatures had a lesser retarding effect than constant high temperatures.

58. SPANNER, D. C.

The suction potential of plant cells and some related topics.

Ann. Bot. Lond., 1952, 16: 379-407, bibl. 19, illus.

This paper is a theoretical discussion of the concept of suction potential or suction pressure as applied to plant cells, especially with reference to the possible occurrence of "active" water-secreting mechanisms. Following an attempt to define what is meant by suction potential there is a discussion of the distinction between "active" and "passive" agencies in relation to water movement and a tabulation of such agencies. Some of the less commonly considered mechanisms are discussed in some detail, and an attempt is made to evaluate how effective they might be in producing increments of turgor pressure. The conclusion is reached that if active mechanisms are operative in cell-water relations, then suction potential cannot adequately be defined in the ordinary way—in fact the "water-absorbing effort" of a cell cannot be completely specified in terms of pressure alone. There are appendices on the possible role of frictional or contact electrification in cell physiology; on the increase of permeability of the plasma membrane to ions and water caused by electrical forces; and on the energy requirement of active water-secreting mechanisms. [Author's abstract.]—*Imp. Coll. Sci. Technol.*, London.

59. SIMONIS, W.

Untersuchungen zum Dürreeffekt. I. Mitteilung. Morphologische Struktur, Wasserhaushalt, Atmung und Photosynthese feucht und trocken gezogener Pflanzen. (Investigations on the effect of drought. I. Morphological structure, water balance, respiration and photosynthesis of plants grown in moist and dry media.)

Planta, 1952, 40: 313-32, bibl. 34. °

In 3 years' experiments *Vicia faba*, *Rorippa nasturtium aquaticum* (*Nasturtium officinale*), *Trifolium incarnatum* and *Andromeda polifolia* were grown in sand or garden soil at 30% and 80% moisture capacity in order to study certain morphological and physiological modifications under drought conditions. Although the plants were chosen for their different morphological responses to drought, they had one reaction in common, viz. the reduction of surface development. In contrast to the widely-held view, the water balance of the leaves (water content: dry weight) was not always reduced but the

degree of succulence was always increased by drought. Osmotic values, viscosity and photosynthesis were also found to be increased in dry culture. Respiration did not show a uniform response to drought in all test plants. In the first place it was related to the leaf water content, and it increased, moreover, with rising dry weight. A general decrease in respiration did not occur in dry culture. Stocker's theory of drought resistance is briefly discussed.—Tierärztliche Hochschule, Hanover.

60. TOMBESI, L., AND FORTINI, S.

Intensità fotosintetica e respiratoria, glutathione ridotto, acido ascorbico e attività catalasica in funzione del regime idrico. (Intensity of photosynthesis, respiration and catalase activity and content of ascorbic acid and glutathione in relation to soil water supply. [English summary $\frac{3}{4}$ p.]

Ann. Sper. agrar., 1952, 6: 461-79, bibl. 10.

The intensity of photosynthesis and respiration and catalase activity, and the variation in content of ascorbic acid and reduced glutathione in the leaves of *Pelargonium zonale* were studied in relation to soil water supply. Photosynthesis and respiratory activity were increased by reduction of the water supply. A relationship possibly exists between photosynthesis and catalase activity in plants under normal and reduced water regimes. From these and previous experiments it is evident that plants kept short of water show greater oxidase activity and a lower content of ascorbic acid and reduced glutathione and have a higher reducing potential. To these factors, which explain the increased intensity of photosynthesis and respiration in such plants, are ascribed the lower content of reduced compounds in their seeds and the higher content of glucides. The catalase content is inversely proportional to that of ascorbic acid.

61. TOMBESI, L.

Il metabolismo dei vegetali e le disponibilità idriche del suolo. Nota I.—Modulo enzimatico e coefficiente ossidastico. (Plant metabolism and soil water supply. Note I. The enzyme complex and oxidase coefficients.) [English summary 1 p.]

Ann. Sper. agrar., 1952, 6: 661-88, bibl. 9, illus.

The carboanhydrase, catalase and peroxidase activity of plants provided with normal and with reduced water supplies is not substantially different. Oxidase content increases and ascorbic acid and glutathione contents tend to diminish with decrease of water supply. Different genera have different enzyme coefficients. The coefficients, $\frac{\text{ascorbic acid}}{\text{oxidase activity}}$ and $\frac{\text{ascorbic acid} + \text{glutathione}}{\text{oxidase activity}}$ are a suitable index of the average respiratory intensity.

62. BÖHNING, R. H., AND LUSANANDANA, B.

A comparative study of gradual and abrupt changes in root temperature on water absorption.

Plant Physiol., 1952, 27: 475-88, bibl. 11, being *Pap. Dep. Bot. Plant Path. Ohio St. Univ.* 545.

The change in rate of water absorption under gradual and abrupt changes in root temperature within the

range of 25° to 5° C. was studied by measuring daily the decrease in volume of the culture solution in which sunflower, tomato and red kidney bean plants were growing. In general, a gradual decrease in temperature resulted in a gradual reduction in the absorption rate, and abrupt changes in temperature resulted in a correspondingly abrupt decrease in the absorption rate to a value slightly below the absorption rate of the plants which had been gradually cooled to that same temperature. The results indicate that change in the viscosity of the protoplasm is a more important factor in controlling water absorption in beans than it is in tomato or sunflower. All plants with root temperature gradually decreased from 25° to 5° C. showed no sign of wilting. Tomato and sunflower plants wilted severely on the day when the temperature was dropped abruptly from 25° to 5° C. and gradually recovered on subsequent days with little or no permanent injury; but bean plants wilted severely and were greatly damaged from desiccation of the foliage when the temperature was abruptly dropped from 25° to 10° C. and from 25° to 5° C., and showed very slow recovery of the uninjured portion of the foliage.

63.* KEMP, E. E.

The water economy of unrooted cuttings.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 6.

Basing his remarks on work at the Edinburgh Botanic Gardens in comparison with that at other centres the author discusses in turn: the water balance of unrooted cuttings and experimental methods used for determining it, the absorption of water—with examples—and, lastly, the movement of water in cuttings.

64. MASUYAMA, J., AND HAMADA, M.

Plant death by heat action.

Mem. Coll. Agric. Kyoto Univ. 64, 1952, pp. 10+tables, bibl. 7.

Old and young leaves of several plant species were immersed in water at 45°-75° C. for periods of 1 sec. to 1 hr. to determine their thermal death points. From the results obtained and a re-examination of data published by other workers a general formula to express the time-temperature relationship is presented.

65. SNOW, M., AND SNOW, R.

Minimum areas and leaf determination.

Proc. roy. Soc. Ser. B, 1952, 139: 545-66, bibl. 19, illus.

From studies reported here it is concluded, in agreement with previous conclusions, that in *Lupinus*, *Euphorbia*, and probably in most dicotyledons, a leaf is determined only when there is available a space on the apex far enough below the growing point and covering some minimum width. This minimum width and distance must be relative to the size of the stem apex and not absolute, so the minimum width is really a minimum arc of the circumference of the apex. This arc is estimated at 122° in non-flowering lupin apices with intact growing points. It is also concluded that in *Lupinus* the central parts of young leaves do not repel the centres of leaves about to arise. Leaf determination in these plants is further discussed in comparison with plants of other groups, notably ferns.

* See note, p. 3.

Growth substances.

(See also 7, 46, 47, 122i, 187, 232-246, 324-329, 341, 342, Weeds and weed control section, 816, 817, 977, 1039, 1054-1056, 1059, 1067, 1068, 1148-1151, 1271.)

66. BROOKLYN BOTANIC GARDEN.

Synthetic plant hormones and other chemicals used to control growth. Uses of hormones in gardening and horticulture.

Brooklyn bot. Gdn. Rec., 1952, 8: 2-111, illus.

This whole number of the journal is devoted to articles by well known authorities on the use of hormones for such purposes as prolonging blossoming in oriental cherries, rooting cuttings, producing parthenocarpic berries on holly, controlling fruiting in tomatoes and figs, preventing preharvest drop in apples, pears and citrus, fruit thinning, inducing flowering in pineapples and litchis, and controlling weeds in lawns, crops and ornamentals. Special attention should be drawn to the article by L. G. Nickell entitled "454 weeds and how to control them" on pp. 58-100 [see abstract 549], and to the list of synthetic hormones compiled by G. A. Vradenburg, Jr., pp. 101-11, which classifies them by their commonest uses and gives their trade names, chemical names and manufacturers.

67. MURNEEK, A. E.

Plant growth-regulators during fertilization and post-fertilization periods.

Proc. Amer. Soc. hort. Sci., 1952, 59: 207-17, bibl. 51, being *J. Ser. Mo. agric. Exp. Stat.* 1246.

The present status of studies on the function of hormones in the sexual reproduction of some crop plants is reviewed, and the need is stressed for more information on the detailed physiology of plant reproduction. Attention is called to the importance of the endosperm and associated tissues in seed and fruit development.

68. NITSCH, J. P.

Plant hormones in the development of fruits.

Quart. Rev. Biol., 1952, 27: 33-57, bibl. 160, illus.

Starting with the assertion that the character which unifies the varied forms and structures of fruits is not a morphological, but a physiological one, the author goes on to review the literature on the regulation of the development of a fruit. He examines in turn the initiation and growth of the fruit before anthesis, the effect of pollination, and the effect of ovular development on fruit growth, and shows how chemical stimuli for fruit development may come from the vegetative part of the plant, the pollen and the ovules.

69. ORDOÑO, A. V.

Artificial production of parthenocarpic fruits.

Philipp. Agric., 1951, 35: 115-29, bibl. 10, illus. [received Sept. 1952].

Field and laboratory studies to compare the effectiveness of naphthaleneacetic acid, indolebutyric acid and naphthoxyacetic acid in inducing parthenocarp were conducted at the Philippines College of Agriculture in 1949-51. Tomato and papaw were used as subjects, and the effect of different concentrations of the hormones and of the number and frequency of sprayings was studied. With tomato naphthoxyacetic acid was the best, and constantly produced good-sized fruits; it gave

a higher percentage of fruit set with morning than with midday or afternoon treatment; naphthaleneacetic acid was better than naphthoxyacetic acid for supplementing natural fruit set in the field; thiamine, when used with naphthaleneacetic acid, increased the size of the fruits. With papaw, ether extract of pollen applied as a lanolin paste, indolebutyric acid, and naphthaleneacetic acid all induced parthenocarp.

70. ALMEIDA, C. R. MARQUES DE.

Acerca do transporte polar das auxinas. (The polar transport of auxins.) [English summary 2½ pp.]

An. Inst. sup. Agron. Lisboa, 1950, 17: 261-305, bibl. 19, illus. [received 1952].

Cuttings of poplar were subjected to various treatments designed to throw light on the polar transport of auxin. It is suggested "that root differentiation and development, at least beyond the primordial stage, appear at the frontier between the physiological and paraphysiological. This frontier would be reached when auxin blockage is attenuated through absence of light resulting in the formation of aerial adventitious roots from the apical end down to the level of the nutritive solution". In the light of the data obtained the author attempts to analyse the growth and development of subterranean, aerial and aquatic root systems and also some phases of the vegetative cycle of the vine.

71. SMITH, M. S., WAIN, R. L., AND WIGHTMAN, F.

Studies on plant growth-regulating substances.

V. Steric factors in relation to mode of action of certain aryloxyalkylcarboxylic acids.

Ann. appl. Biol., 1952, 39: 295-307, bibl. 22, illus.

Three synthetic growth-regulating substances, α -(2-naphthoxy)-, α -(2:4-dichlorophenoxy)- and α -(2:4:5-trichlorophenoxy)-propionic acids, have been resolved into their (+) and (-) forms. The physiological activity of these isomers and of the racemic compounds has been investigated using the pea curvature and *Avena* cylinder test methods of assessment. The (+)-isomers in each case displayed high activity in both tests, whereas that exhibited by the (-)-isomers was negligible. The racemic compounds showed intermediate activity. The mode of action of aryloxyalkylcarboxylic acids is discussed in the light of the results presented. These considerations suggest the possibility that the activity of the (+)-isomers might be antagonized by the presence of the corresponding inactive enantiomorphs. Our experiments show that such antagonism does in fact operate. [Authors' summary.]

72. LIGETT, W. B., AND OTHERS.

A new plant growth regulator— α -cyano- β -(2,4-dichlorophenyl) acrylic acid.

Science, 1952, 116: 393-4, bibl. 1, illus.

This compound, and especially its diethanolamine salt, applied at low concentrations, inhibited the growth of tomato plants and the flowering of marigolds. Its mode of action appears to differ from that of maleic hydrazide.

73. BROWN, J. W., AND WEINTRAUB, R. L.

Influence of temperature on formative response of bean seedlings to 2,4-dichlorophenoxyacetic acid.

Bot. Gaz., 1952, 113: 479-82, bibl. 6.

Expansion of the first trifoliate leaf of the bean seedling (*Phaseolus vulgaris* L., var. Black Valentine) exhibits a sharp temperature optimum at approximately 31° C. Expansion is repressed by application of 2,4-D directly to the terminal bud; the degree of repression is proportional to the logarithm of the dose. The percentage repression owing to a particular dose is constant over the range 22°-34° C., indicating that no temperature-limited process is involved in the inhibition. [Authors' summary.]—Chem. Corps biol. Labs, Camp Detrick, Frederick, Md.

74. REBSTOCK, T. L., AND OTHERS.

Effect of 2,4-dichlorophenoxyacetic acid on proteolytic activity of red kidney bean plants.

Plant Physiol., 1952, **27**: 639-43, bibl. 16, being *J. Agr. Mich. agric. Exp. Stat.* 1304.

The results obtained confirm the suggestion made by Sell *et al.* [*H.A.*, 19: 2075] that one factor associated with the effect of 2,4-D is the utilization of carbohydrate in the synthesis of protein. This increase in protein may be responsible for the proliferation of the stems in 2,4-D treated plants.

75. MOEWUS, F., AND MOEWUS, L.

Sensitivity of cress roots to indole-acetic acid.

Nature, 1952, **170**: 372, bibl. 7.

The roots of germinating cress seeds were found to have no constant growth-rate, in spite of constant conditions, but to pass through 3 phases of growth: (1) at the beginning of germination, low growth-rate, (2) when 5-6 mm. long, maximum growth rate, (3) when 20-25 mm. long, decreasing growth-rate. The authors showed that the concentration of indoleacetic acid in roots of the second phase is about double that of the third phase. An acceleration of the growth-rate by indoleacetic acid treatment occurred only when the growth rate was less than optimal. As the acid content of cress seeds from the same source varied greatly with year of harvest, the time required to reach the third phase varied also. Hence, the growth curves of cress seed should be determined before the test is applied.—University of Sidney.

76. THIMANN, K. V., AND BONNER, W. D.

Inhibition of plant growth by protoanemonin and coumarin, and its prevention by BAL.

From photostat *Proc. nat. Acad. Sci. U.S.A.*, 1949, **35**: 272-6, bibl. 9 [received 1952].

It is concluded that coumarin and protoanemonin inhibit growth through reacting with a sulphhydryl enzyme, and that this enzyme is normally a limiting factor in growth, and is very probably the same as that inhibited by iodoacetate and arsenite. The paper was read before the Academy in April, 1945.—Harvard University.

Radioactive materials.

(See also 121r, 122h, 648.)

77. GERICKE, S.

Wirkung radioaktiver Stoffe auf das Pflanzenwachstum. (The effect of radioactive substances on plant growth.)

Landw. Forschung, 1952, **2**. Sonderheft, pp. 72-6, bibl. 12.

Available data show clearly that no improvement in

yield or quality can be expected from the use of radioactive materials in fertilizers. The curative effect of radioactive radiation in the case of bacterial or virus diseases remains to be studied.

78. LIARD, O.

Le phosphore radioactif et l'étude de la dispersion des solutions salines dans le sol.

(Radioactive phosphorus and the study of the dispersal of solutions of salts in the soil.)

Fruit belge, 1952, **20**: 129-31.

Studies at Gembloux give promise of providing valuable information on the application of mineral fertilizers and the means whereby technique can be improved.

79. KURSANOV, A. L., KUZIN, A. M., AND MAMULJ, JA. V.

The ability of a plant to assimilate carbonates in the soil solution. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, **79**: 685-7, bibl. 7, illus.

Bean plants (*Phaseolus vulgaris*) were grown in Knop's solution containing sodium bicarbonate with C¹⁴, under artificial light. Radio-autographs of roots, stems and leaves showed that the radioactive carbonate spread to all parts of the plants; it was particularly high in the stems and somewhat low in the leaves.

80. KLEČKOVSKIĀ, V. M., AND EVDOKIMOVA, T. P.

The radio-autographic determination of the localization of radio-isotopes in plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, **79**: 629-32, bibl. 4, illus.

The radio-autographic determination of the localization of radio-isotopes in plants is described in relation to experiments on apple and maize. Photographs show the localization of P³² in the seeds of apples and in the veins of apple leaves.

Nutrition.

(See also 121y, 208-224, 1371, 1385.)

81.* WALLACE, T.

Some aspects of the mineral nutrition of horticultural plants.

[Gen. Pap.] *13th int. hort. Congr.*, London, 1952, pp. ?

1. Some modern concepts concerning the mineral nutrition of plants are discussed. A system of classification which has been proposed for the mineral elements found in plants is given. The classification is based on the effects of the elements on plant growth and recognizes three major groups: essential, beneficial, and "other" elements. The concept of the mineral status of plants concerns the quantities and balance of the mineral nutrients and the effects of the "other" elements; the problems relating to status concern deficiencies, excesses and interaction on the nutrients and any special effects produced by the "other" elements. Interactions between elements are of two kinds—antagonisms and synergisms—and the actions may occur either in the soil, affecting absorption, or within the plant tissues, affecting translocation or functions. The more important deficiency and excess effects of elements are

* See note, p. 3.

summarized, and examples are given of antagonisms and synergisms. 2. Some soil conditions of special importance that influence the nutrition of plants are discussed under the following headings: (a) the "fixing" power of soils for nutrients. (b) the effects of soil acidity and alkalinity on the availability of mineral nutrients. (c) organic matter in relation to the supply of mineral nutrients. (d) drainage and aeration effects. It is shown how each of these factors may influence the availability of individual nutrients. 3. Attention is drawn to some special problems of mineral nutrition that are presented by various kinds of horticultural crops, particularly by trees and shrubs. The special problems arising from the usual cultural conditions under which horticultural plants are grown are outlined, and differences between the problems of agricultural and horticultural crops are indicated. 4. A list is given of the various methods that may be used to supply mineral nutrients to horticultural crops. These methods provide suitable alternatives for use with the diverse types of horticultural plants and for supplying the various nutrients under special soil and cultural conditions. [Author's summary.]

82. HOMÈS, M. V. L.
L'alimentation minérale des plantes cultivées. (Mineral nutrition of cultivated plants.)
Commun. 8th Congr. int. ind. Agric., 1950, 2: 247-53, from abstr. in *Soils and Ferts*, 1952, 15, No. 1367.

Trials involving only single nutrients or the N-P-K balance lead to non-comparable results in plant-nutrition studies. It is proposed that all experimental studies should include a consideration of the relationship between environment and yield, and also of all the major nutrients and the equilibria of cations and anions. In a series of trials it is the total number of chemical equivalents rather than the total weights of oxides, anhydrides and elementary N that ought to be kept at a constant level. The concept is illustrated by experimental data from trials with oil palms.

83. OLIVER, W. F.
Absorption and translocation of phosphorus by foliage.
Sci. Agric., 1952, 32: 427-32, bibl. 4, illus.

Using a labelled phosphatic fertilizer it has been shown that phosphorus applied to the foliage of beans and corn can be absorbed and translocated throughout the plant. The absorption and translocation is greatest in the rapidly growing parts of the plant. The phosphorus content of beans and corn in locations where phosphatic fertilizers have been applied to the surface of the soil may be due in part to absorption from fertilizer particles splashed on to the leaves by rain drops. [Author's summary.]

84. HOFMANN, E.
Über die Wirkung der Kali- und Stickstoffdüngung auf Fermentgehalt, Qualität und Haltbarkeit pflanzlicher Erzeugnisse. (On the effect of potassium and nitrogen manuring on enzyme content, quality and storage life of plant products.)
Landw. Forschung, 1952, 2. Sonderheft, pp. 68-72.

Data are presented on the effect of N and K manuring on the saccharase content of lettuce and on the saccharase, β -glucosidase and β -galactosidase content of cabbage. In general, it was found that enzyme formation in normal quantities depends on an adequate supply of N. Excessive N or deficient K tended to increase enzyme formation beyond the optimum level with the result that high molecular substances were decomposed rapidly and quality suffered.—*Technische Hochschule München-Weihenstephan*.

85. HOPE, A. B., AND STEVENS, P. G.
Electric potential differences in bean roots and their relation to salt uptake.
Aust. J. sci. Res., Ser. B, biol. Sci., 1952, 5: 335-43, bibl. 10, illus.

Reversible diffusion of KCl is shown to occur between an aqueous solution and young bean roots, probably in the protoplasmic phase. Evidence for this is presented from a study of electric potential difference (p.d.) changes and changes in environmental salt concentration in different samples but under comparable conditions. The evidence supports the hypothesis that electric p.d.'s between young root tissue and surrounding electrolytes are the result of differential mobility of cations and anions in the protoplasmic phase of the epidermal cells. The relation of the evidence to theories postulating a high resistance barrier to ion diffusion at the boundary of protoplasm and environment is discussed. It is concluded that the properties of the protoplasm/environment boundary do not include high resistance to ion diffusion. It is possible that protoplasm contains a certain concentration of non-mobile anions resulting in a Donnan distribution of ions between this phase and the surrounding solution. Ways of testing this hypothesis are suggested. [From authors' summary.]

86. JOHNSON, C. M., PEARSON, G. A., AND STOUT, P. R.
Molybdenum nutrition of crop plants. II. Plant and soil factors concerned with molybdenum deficiencies in crop plants.*
Plant and Soil, 1952, 4: 178-96, bibl. 17.

In order to provide a low molybdenum medium for comparative growth studies of a wide number of crop plants, a serpentine soil was treated with a high calcium fertilizer to provide an adequate level of calcium as well as nitrogen, phosphorus, sulphur and potassium. Greenhouse studies of a number of different species all grown under the same cultural conditions revealed several different factors concerned with molybdenum deficiency in crop plants. Classification of the growth responses of the 30 different crop plants on the same low molybdenum soil permits certain tentative generalizations to be made regarding the molybdenum extracting abilities and physiological requirements of the species studied under these experimental conditions. Consideration of the analytical data for molybdenum concentrations in seeds and the foliage of plants grown on this soil shows that seed-borne molybdenum could account in part for the ability of some of the legumes (cowpeas and beans) and grasses to grow normally on this medium, but that some of the species in these families must have been relatively efficient in extracting molybdenum from this soil because the seed-borne

* For Part I, see *H.A.*, 22: 1166.

molybdenum was entirely negligible as compared with the total amounts found in the foliage of mature plants. Comparisons of the molybdenum concentrations in the foliage of plants grown on soil without molybdenum supplements suggest that some of the species may require higher concentrations of foliar molybdenum than do others. For example, healthy barley, maize, oats and wheat contained in the order of 0.03 to 0.07 p.p.m. molybdenum while tomatoes, sugar beet, squash and spinach contained as much as 0.10–0.20 p.p.m. molybdenum while being moderately to actually molybdenum deficient, as judged by foliar symptoms and nitrate nitrogen concentration in the foliage. Addition of 1 p.p.m. molybdenum (on dry soil basis) prevented the appearance of the foliar symptoms, resulting in increased growth and decreased nitrate nitrogen concentrations in the leaf tissue. The most general foliar manifestation of molybdenum deficiency was leaf chlorosis. Deficiency in tomato, squash, broccoli, kale and cabbage was characterized by an interveinal chlorosis pattern but in many other species the chlorosis was more diffuse, resembling nitrogen deficiency. Blade distortion was frequently associated with molybdenum deficiency, as for example in the whiptail disease of cauliflower, cupping and curling of tomato blades, and cupping of sugar beet and buckwheat blades. [From authors' summary.]—Agric. Exp. Stat., Berkeley, Calif.

Soil management and irrigation.

(See also 121k, q, z, 188-207, 225-231, 339, 340, 359, 570, 979, 1204, 1281, 1382, 1383.)

- 87.* EDELMAN, C. H.
Suitability of soils for horticultural crops
and some related soil problems in the Netherlands.
[Gen. Pap.] 13th int. hort. Congr., London,
1952, pp. ?

In consequence of the technical progress in the management of horticultural crops up to 1940 very little attention had been paid to soil survey in the Netherlands. When, as a result of war conditions, a survey of soils in a fruit-farming district was undertaken in 1943, it soon became evident that the soil profile is extremely important to success in horticulture. Earliness, a first consideration in market gardening, proved to depend to a large extent on the soil profile. The occurrence of interrupting layers in the subsoil frequently proved the reason for poor growth of fruit trees. Since the war two principal methods have been applied in the investigations to determine the relation between soil and crop in horticulture, viz.: 1. The best-holdings method of Van Liere, 2. The poor-patches of De Bakker. Both with regard to the planting of orchards and to the growing of various vegetable crops and bulbs, very decisive evidence has already been gained as to the most desirable soil types for these purposes. Also in designing a horticultural settlement scheme soil survey is of outstanding importance. [Author's summary.]

- 88.* FURNEAUX, B. S.
Some problems in the management of soil.
[Mim. Pap.] 13th int. hort. Congr., London,
1952, pp. 4.

* See note, p. 3.

The physical condition of the soil is no less important for the well-being of the crop than its chemical composition. The root system is far more extensive than is generally supposed. Its chief function is to collect water with nutrients in solution but, at the same time, it must breathe. It is dependent upon free access of air and water. These find their way into the soil by means of a well-developed system of communications which is the outcome of the activities of numerous organisms, including bacteria, fungi and earthworms, as well as roots. They are dependent upon adequate supplies of organic matter for their food. If these fall low, the structure deteriorates in consequence. Very often the structure is destroyed by cultivations and a pan is produced. Water begins to lie on the surface of the land and air cannot easily enter. Modern machinery is partly responsible for a steady deterioration in soil structure. Suggestions are put forward for its maintenance. [Author's summary.]

89. WEBSTER, G. R., AND OTHERS.
Mulches for horticultural crops.
Mimeo. Saanichton Domin. exp. Stat. 134,
1952, pp. 9, illus.

This is the second report on the mulching experiments carried out at the Dominion Experimental Station, Saanichton, B.C. [For the first report, see *H.A.*, 22: 60.] Many of the results can still not be considered final. *Organic mulches for boysenberries*: Sawdust mulch gave higher yields than either hay mulch, hay incorporated or summer cultivation; sod was detrimental. Both types of mulch gave better cane growth than the other treatments. *Sawdust mulch for loganberries* increased both yields and cane growth considerably compared with clean cultivation. *Hay mulch for pears* increased yields and annual terminal growth compared with clean cultivation. *Sawdust mulch for cherries* appeared to arrest the decline of old trees compared with trees left in sod. *Sawdust mulch for bulbs* greatly increased the number of grade 1 tulip flowers, the proportion of large-sized tulip and iris bulbs and the total weight of bulbs. *Sawdust mulch for vegetables*: On unirrigated plots the best results with spinach and carrots were obtained by a 2-in. sawdust mulch, the seed being sown on the soil surface. Tomatoes gave highest yields when transplanted into soil into which 4 in. sawdust had been incorporated. *Sawdust mulch for roses* controlled weed growth but it remains to be determined whether it will encourage shoots from the rootstocks. *Sawdust mulch for newly seeded lawns*, $\frac{1}{2}$ in. spread over the seed on the soil surface, gave better growth in an unreplicated trial than raking the seed in in the normal manner, and prevented bunching of the seed. Some general recommendations are made on the use of sawdust in the home garden.

90. ROBERTS, A. N., AND STEPHENSON, R. E.
Sawdust and other wood wastes as mulches
for horticultural crops.
Reprinted from 40th A.R. Ore. St. hort. Soc.
for 1948 as Tech. Pap. Ore. agric. Exp. Stat.
576, pp. 8, bibl. 7.

A brief review of work on the value of sawdust as a mulch or soil amendment for horticultural crops is followed by a report of preliminary experiments started in 1943 by the Oregon Agricultural Experiment Station.

Crops included were tomatoes, potatoes, blueberries, raspberries, strawberries and some ornamental plants. The soil was a chehalis silty clay loam. Where 3-4 in. of fir sawdust was incorporated in the soil it took about 4 years before there was no longer any depression of nitrates; with alder sawdust it took only 3 years. Shredded redwood bark and cedar tow decomposed so slowly that they did not noticeably depress available nitrates. When used as a mulch sawdust decomposes more slowly and has less effect on soil nitrogen than when incorporated into the soil. In the case of tomatoes and potatoes, approximately 400 lb. N per acre is required during the first year to offset the nitrate depression resulting from 3-4 in. fir or alder sawdust incorporated into the soil; in the second year 200 lb. N is required for fir sawdust and 100 lb. N for alder sawdust, with corresponding reductions in the third year. In the case of strawberries only 100 lb. N per acre in the first and second year is required when fir or alder sawdust is incorporated. Where sawdust is used as a mulch the N requirements are considerably less. Fir sawdust appeared to be a promising mulch for blueberries and only 100 lb. N per acre per year was required. Sawdust, especially when used as a mulch, increased the effectiveness of inorganic fertilizers. More extensive trials are now being carried out.

- 91.* STOUGHTON, R. H.
Manurial composts from habitation and other waste material.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 6.

Under a grant from the Agricultural Research Council experimental work on the preparation of manurial composts from sewage sludge and household refuse or straw was carried out. The changes during fermentation are described and the effect of varying the conditions of composting are discussed. The conditions necessary for the preparation of a satisfactory compost are outlined and pot and field experiments on various experimental composts discussed. It is shown that the principal value of these composts lies in their nitrogen content and availability but there is evidence also that they improve the physical condition of the soil.

- 92.* LLOYD, A. J., AND MORGAN, C. E.
Improving soil structure. Krilium soil conditioner.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 7.

The authors summarize their general discussion of the functions and results claimed for krilium as follows: "Kriliun soil conditioner is a new synthetic poly-electrolyte which, when mixed with soil, promotes and stabilizes good crumb structure. It is unaffected by leaching, and has remained effective after a single treatment for a number of years. Soils treated with krilium possess greater aeration, greater water holding capacity, yet with improved drainage properties and easier workability at a higher moisture content level. By virtue of its non-compacting and non-caking properties, improved germination and root growth are promoted, together with greater availability of soil nutrients."

* See note, p. 3.

- 93.* NICHOLSON, H. H.

The control of ground water level in crop production.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 5.

Much valuable agricultural land has been obtained by lowering the ground water level in swampy areas. Is there an optimum ground water level for the purposes of agriculture? The history of the Fenland in Britain is outlined and a current experiment on the control of ground water level is described. Three years' experience with the celery crop has shown that benefit can be obtained from static ground water levels as high as 20 inches, but that in moist summers both yield and quality are depressed by levels higher than 20-24 inches. The celery crop is planted here in early June when normally a moisture deficit is appearing in the soil. The magnitude and time of incidence of this deficit are conditioned by the rainfall sequence of June-September inclusive and can be modified by the control of the ground water. Thus, in a dry summer, a high ground water level gives optimum moisture conditions and a low level gives full play to the limiting influence of an increasing deficit of moisture in the soil. In moist summers this is mitigated to the advantage of the crop above a low water level, but in the presence of a high ground water level water-logging may result from the same rainfall to the disadvantage of the crop. [Author's summary.]

94. RENOUE, L. R.
Irrigation of horticultural crops.
N.Z. J. Agric., 1952, 84: 475-8; 85: 23-32, illus.

Irrigation of horticultural crops has proved profitable in New Zealand, not only in very low rainfall areas, but also on lighter soils and for shallow-rooted crops in the higher rainfall districts where dry spells occur at intervals in the growing season. The principles and costs involved are discussed. Sprinkler irrigation, the only method by which efficient irrigation can be carried out on porous soils and on slopes with erodable soils, is described in some detail.

95. ARNOT, E. M.
Irrigation.
Decid. Fruit Gr, 1952, 2 (1): 9-11, (2): 9-12, (3): 9-13, (4): 9-11, (5): 21-3, (7): 16-18, illus.

After a consideration of general principles open channels and pipelines are discussed. The advantages of lined compared with unlined channels are that a smaller cross section can be used and seepage losses and maintenance costs are much reduced. The carrying capacity of an open channel depends on its slope, shape, size and material of construction. For lined channels the slope is generally between 1 in 500 and 1 in 2,000 and the most efficient shape is semi-circular followed (generally) by trapezoidal and then by rectangular. The quantity of water discharged from a gravity-flow pipeline depends on its shape, diameter and material of construction; a rough guide to frictional resistance is given. The chief types of pump used in irrigation for pumping surface water are piston and centrifugal pumps. The former deliver a constant amount, take more horsepower as the head increases, are self-priming

* See note, p. 3.

and have a suction lift of up to 25 feet. Centrifugal pumps, which are the more commonly used, do not deliver as much water against a high head as a low one, take less horsepower as the head increases, require priming and have a maximum suction lift of 15-18 feet; the different types are discussed (the horizontal split casing type has a high efficiency), together with their performance in relation to operational speed and impeller diameter. Boreholes, which are usually cased with steel piping for all or part of their depth, are generally 6 and 8 in. in diameter. The different types of borehole pump (windmill, powerhead, deepwell turbine and submersible) are described.

96. MARR, J. C.

The border method of irrigation. Its design, construction and use in California.

Circ. Calif. agric. Exp. Stat. 408, 1952, pp. 24, illus.

In this method, which is used in some orchards in California, water is applied to land between parallel ridges or borders. A supply ditch or pipeline is located at the upper edge of the irrigation area and the water moves down the slope between the ridges, which are parallel with the direction of slope. The irrigation strips may be 200-2,000 ft. long depending on slope and soil type, and 15-100 ft. wide depending on cross slope (which should ideally be nil), steepness of slope, stream available and crop. The irrigation slope depends on the crop but a uniform slope of 0.2-0.3% is usually ideal.

97. BEAN, G.

Overhead irrigation.

Fm Mech., 1952, 4: 193-6, 240-3, 285-7.

In this paper on the technical considerations of overhead spraying fundamental points such as water source, power source, horsepower requirements and friction head are first reviewed. Water source and types of pump are then discussed and finally types of spray lines and sprinklers.

98. CARL, A.

Verbesserung des bodennahen Klimas und Frostschutz durch Beregnung. (Sprinkler irrigation for the improvement of the climate close to the soil and for frost protection.)

Ber. dtsh. Wetterdienst. U.S. Zone 32, 1952, pp. 78-82.

The author's chief contention is that sprinkler irrigation should be used, not only to supply the water requirements of a crop, but to improve the microclimate during hot, dry spells occurring at a critical period of the plants' development. This aim can only be achieved by extending the time of irrigation and by reducing the amount of water supplied correspondingly, if possible to below 2 mm. per hour. Recent developments of sprinklers in Germany are discussed from this point of view. The paper, which was read at an agrometeorological meeting in April 1951, encountered the opposition of other workers who denied that continuous irrigation for many hours would benefit a crop. Frost protection by irrigation is mentioned very briefly.

99. MYERS, E. A.

A field plot irrigator.

Progr. Rep. Pa agric. Exp. Stat. 83, 1952, pp. 4, illus.

Scale drawings show all major parts. A 1 h.p. engine provides power for moving the carriage which supports a 16 ft. 10-nozzle boom with a 24 ft. travel. At 30 lb. per sq. in. pressure, water, which is supplied through a 1½ h.p. engine, can be applied at 396 gal. (=1.65 in.) per hour to a 16×24 ft. plot.

100. WEBSTER, G. R., AND OTHERS.

Irrigation experiments 1951.

Mimeo. Domin. exp. Stat. Saanichton 135, 1952, pp. 10.

Notes are given on sprinkler irrigation experiments with strawberries, raspberries, loganberries, vegetables, bulbs and E.M. IX apple rootstocks. Water was applied when 50% available moisture in the major rooting zone had been used or lost by evaporation, as judged by a simple test. Sufficient water should be applied to wet the entire root zone. One acre-inch per irrigation wets the soil to a 12-inch depth on sandy soils and 1.5 acre-inches on clay loams. Some general facts and recommendations regarding irrigation on Vancouver Island are given.

101.* PENMAN, H. L.

The physical bases of irrigation control.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 12, bibl. 14.

Irrigation designed to replace transpiration losses can be controlled if transpiration rates can be adequately estimated. As a particular form of natural evaporation, transpiration is dominantly a weather-controlled phenomenon in which plant character plays only a minor part, and rates can be calculated from weather data. The physical principles, involving energy supply and turbulent transport of vapour are outlined for open water, first because they are most clearly revealed for open water, and second because for S.E. England it has been possible to convert estimated open water evaporation into estimated transpiration by using an empirical conversion factor. By an extension of the principles and the introduction of stomatal and daylength factors, it has proved possible to eliminate local factors and to estimate transpiration rate directly from weather data without first calculating the rate for a hypothetical open water surface. The special case of orchard crops is separately treated. Field checks, chiefly in the more extreme climate of southern Australia, have been satisfactory, but only by accepting somewhat arbitrary values of stomatal conductance for diffusive flow of water vapour. The checks are equally successful for short crops and for orchard crops. [Author's summary.]

102. PENMAN, H. L.

The role of vegetation in meteorology, soil mechanics and hydrology.

Reprinted from *Brit. J. appl. Phys.*, 1951, 2: 145-51, bibl. 13, illus.

By transpiration plants play a dominant part in the water and heat balances of the earth's surface. The amount of water transpired can be calculated from easily measured weather elements, and it is shown, by reference to an experiment on sugar beet, how calculation of the transpiration rate can be made the basis of controlled irrigation to produce maximum growth without waste of water. The principle can be applied

* See note, p. 3.

equally successfully to a field, to a catchment area and to the British Isles as a whole.

103. GREEN, R. L.

A photographic technique for measuring the sizes and velocities of water drops from irrigation sprinklers.

Agric. Engng, St. Joseph, Mich., 1952, 33: 563-4, 566, 568, bibl. 4, illus., being *J. Pap. Mich. agric. Exp. Stat.* 1300.

1. The sizes and velocities of drops of water from irrigation sprinklers may be measured with reasonable accuracy by means of photographs. 2. By analysis of several photographs made at different distances from the sprinkler, an accurate description of the distribution of drop sizes and drop velocities could be obtained. These data would permit the mathematical calculation of the total impact forces that affect the soil per unit of time at a given rate of application. If these data were obtained, they could be correlated with pumping costs so the economic relationship might be established. 3. The technique described used either alone or in conjunction with direct measurements of the effects of impact forces on the soil would permit a more complete description of sprinklers than is now used and would provide an improved basis for the selection of equipment best adapted to various soil and crop conditions. [Author's summary.]

Culture media.

104. TINCKER, M. A. H., AND JOHNSON, E.

The soilless cultivation of plants.

World Crops, 1952, 4: 201-5, bibl. 32, illus.

This review of methods and results obtained with various vegetables and flowers includes an account of the large-scale installations on Ascension Island and in the Bahamas.

105.* RINGWALD, F.

Culture sur eau et sur sable. (Water and sand culture.)

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 5.

The author discusses the inherent differences between water and soil culture. He deals briefly with gravel culture and with moss culture and certain practical problems arising in different soilless culture systems.

106. STOKES, P.

A new technique for the sterile culture of plant embryos *in vitro*.

Nature, 1952, 170: 242, bibl. 1.

The technique described combines the simplicity of the flask method with the ease of microscopical examination afforded by the hanging drop method. The embryos are grown on two strips of filter paper supported on a glass strip. This is placed in a boiling tube containing 5 c.c. of liquid medium so that it rests nearly vertically with one end in the medium. The medium is absorbed by the filter paper and is readily available to the embryos, which are thus surrounded by a film of nutrients and also have free access to the air. A fortnightly change of the nutrient solution is effected without any disturbance to the embryos.—University College, London.

* See note, p. 3.

Glasshouse practice.

107.* ROODENBURG, J. W. M.

Environmental factors in greenhouse culture.

[*Gen. Pap.*] 13th int. hort. Congr., London, 1952, pp. ?

1. It is often believed that in greenhouse culture constant conditions are desirable. In a natural environment this is never realized and the same is true for the somewhat artificial climate of a glasshouse. 2. Alternation of environmental factors, such as temperature and light, often promotes growth and/or development (thermo-periodicity, photoperiodism). 3. These variations are mainly connected with the course of the sun, whose radiation causes great differences under glass in temperature and light, between day and night, summer and winter. 4. It suffices to correct the extremes of low or high temperatures and light intensities by heating and lighting, ventilating and shading. 5. Low temperatures are often favourable or even necessary for flower-bud initiation of various crops in winter (e.g. tomato, cineraria, etc.). 6. Though plant growth in a greenhouse is seriously limited by the small amount of light in winter, this seldom leads, at our latitude, to starvation by lack of carbohydrates. 7. Much more important is the influence of the short days in winter, through which the hormonal state within the plant can be radically altered. 8. Frequently a retardation of stem growth and, in some species, a winter rest occur. Tuber formation is often connected to short days. 9. In winter-flowering begonia, intermediate day lengths promote flower formation; the shorter days lead to winter rest. 10. Winter-flowering greenhouse plants generally need a certain short day length for flower bud initiation. Here flower buds emerge every year at the same date (Poinsettia). 11. Summer flowering may be the result of longer days, which often have an elongating effect on stems, causing outgrowth of inflorescences. 12. Many main florist crops are but little sensitive to length of day. They belong to the ever blooming type (roses, carnations). The greater production of flowers in summertime is more dependent on the stronger photosynthesis. [Author's summary.]

108.* VAN DEN MUIJZENBERG, E. W. B.

The influence of the air-conditioned glasshouse on the growth of plants.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7, bibl. 9.

A survey is given of the importance of different growth factors which are influenced by the glasshouse and especially by the air-conditioned, diffusion-tight glasshouse, illustrated by results of personal research. The total world-glass area is about 12,000 ha. (30,000 acres) of which a quarter is in the Netherlands. The development in glasshouse building and heating is towards the provision of more light and centralization of heat development, and decentralization of heat supply in the glasshouse. Whereas in the nineteenth century quantity seemed to be of the greatest importance, now quality is more the aim. The desired quantity of heat for a fixed period for a hothouse or hot frame is calculated on the principle that one has to use the inside temperature of an unheated glasshouse as a basis instead of the outside temperature, as is supported by our own [Dutch] trials with electrically heated frames. Results are given of

* See note, p. 3.

heating by air stream, which are promising for better growth. Further attention is being paid to the vernalization of endive, chicory and Chinese cabbage. As to light, special attention is being paid to the importance of the influence of different light sources and photoperiodicity on some horticultural crops, especially strawberries; and to the insufficient control exercised, when comparing the influence of short and ordinary or long day. A suggestion is made for very fine sprinkling in the air-conditioned glasshouse. In the use of carbon dioxide many poor results seemed to be caused by formation of sulphur dioxide and not by too high a concentration of carbon dioxide. Some results of gravel culture and use of chemicals in growth conditioning, as well as the possibilities of commercial use of air-conditioned glass-houses are discussed. [Author's summary.]

109. GRAY, A.
Electricity and horticulture.
Gdnrs' Chron., 1952, 131: 40-1, 64-5, 122,
198-9, illus.

Four articles on soil warming and heating greenhouses electrically. The economics of electrical heating are carefully considered, and it is shown that the efficiency of greenhouses already provided with conventional space heating can be improved, at a comparatively low cost, by the addition of electrical soil warmers.

- 110.* BROWN, C. A. C.
The application of electricity to commercial growing.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 10, bibl. 4.

Since the war the use of electricity by the British commercial horticulturist has expanded steadily. The main line of expansion has been in the use of soil warming equipment which has developed on the low-voltage principle. A transformer provides a supply at from 6 to 30 volts depending on the scale of operation, and this feeds bare galvanized steel wires to provide the warmth. Such equipment has been applied to warming soil in hotbeds, under cloches and in glasshouse beds and borders, as well as in providing warmed propagating beds in frames and benches in propagating houses. Space heating by electricity has not been encouraged; nevertheless, it has been adopted for many smaller houses, mainly for propagating. [Author's summary.]

- 111.* GOLDING, E. W.
The use of electricity to increase soil temperature.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 11, diagrams 9.

Electrical methods of raising soil temperature are discussed under the two main headings of Soil Warming and Soil Sterilization. Brief descriptions of the necessary techniques and equipment are given, but emphasis is laid upon the energy consumption for specified temperature rises and on the temperature distribution in the soil under conditions which occur both naturally and with different arrangements of the heating elements. The influence of temperature gradient upon the technique required for practical application by electrical methods is discussed. The researches of the Electrical Research Association on electrical soil warming and soil sterilization are briefly described and some of the

results obtained in these researches are given. [Author's summary.]

112. CANHAM, A. E.
Electrode soil sterilizing. (Preliminary report.)
Tech. Rep. Brit. elect. Res. Ass. W/T21,
1951, pp. 11, bibl. 3, illus., 9s.

This report gives the results of experiments on the current flow through the soil from rod electrodes in an investigation of the basic problems associated with this method of sterilizing soil. The effects of moisture content, of soil density and of the addition of electrolyte on the current flowing and on the temperature distribution in the soil have been studied with a view to developing a practical method of sterilizing tomato bed soil *in situ* using low voltage transformers. [Author's summary.]

- 113.* BEWLEY, W. F.
Steam sterilization of glasshouse soils.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 4.

Steam sterilization is employed by growers in England to maintain a high level of tomato production and is possibly more important than any other process in the cultivation of this crop. Steam generated in 20-30 HP loco type boilers, producing 1,650-3,000 lb. of steam per hour, passes through a well-designed line of pipes, steam-trap and distributors to sets of perforated pipes buried 12-15 inches in the soil. These pipes are either built up in the form of rigid "grids", or are handled as separate pipes in the "Hoddesdon" pipe system. In nursery practice a continuous flow of steam is provided with a pressure of 90 lb. on the boiler. Steam is passed through the grids for 10 minutes after the soil has reached a temperature of 212° F. It is important to see that the soil is not too wet or too dry when commencing steaming and that every part of the soil is heated to steaming temperature, paying special attention to the foundations of walls, posts, etc. After steaming the soil should be flooded heavily with water, although scientific reasons for this are not forthcoming. Good soils receive potash only as a base fertilizer after steam sterilization—poorer soils often require a complete fertilizer. [Author's summary.]

- 114.* ROODENBURG, J. W. M.
Irradiation of greenhouse plants by artificial light sources.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 6, bibl. 12.

The use of artificial light is restricted mainly by economic considerations. The measurement of light must be exact and is expressed in energy values. Weak light intensities are of use at night only. High intensities are needed for photosynthesis and can be used day or night. The use of such light is important for short day plants. The night use of incandescent lamps represents an overdose of daylight and results in abnormal stem lengthening. Such light can, however, be used as a cheap form of high-intensity radiation during winter days. It also has the effect of inducing higher day temperatures, which are of interest to plants of thermo-periodic sensitivity.

* See note, p. 3.

* See note, p. 3.

115. VAN SLUIS, E. J. H.

Artificial light in horticulture.

World Crops, 1952, 4: 161-3, 166, bibl. 3, illus.

An account is given of recent work at the Philips Physical Laboratories at Eindhoven, Holland. Investigations are concerned with the amounts of light needed by different plants, types of light, and the effects of photoperiodicity; light intensity is to be investigated in the future. Results obtained included the ripening of tomatoes and cucumbers in mid-winter; the inducement of autumnal symptoms, including leaf fall in poplars, with short photoperiods; the forcing of tulips in heat-insulated sheds with artificial light instead of in hot-houses; the modification of growth in lettuces with coloured lights; and the colouring of apples picked green by irradiation with blue light.

Practical devices.

(See also 122e, f, 247, 248, 534-541, 941-943, 1147.)

116. CALVERT, J.

An apparatus for cutting and treating plant (or animal) tissue in one operation.

J. Aust. Inst. agric. Sci., 1952, 18: 105-7, bibl. 1, illus.

The apparatus described consists of a small pump mounted on secateurs and fed from a small reservoir. It was designed initially to combine the operations of topping tobacco and applying growth substances to the cut surface, but could also be used to treat vines suffering from zinc deficiency, apply fungicidal preparations to pruning cuts or treat cut suckers or seedlings with hormone herbicides.

117. ZOBRIST, L., AND DEFFNER, U.

Neue Holzschutzmittel für den Gärtner. (New wood preservatives for the gardener.)

Schweiz. Gärtnerztg, 1952, Vol. 55, No. 6, pp. 1½, illus.

The merits of the new "Xylophene" preparations produced by the Swiss firm, Dr. R. Maag, are discussed in comparison with carbolineum.

118. BROWN, J. G., AND OTHERS.

A line operated photomultiplier unit for measuring spectral emissions in flame analysis.

Proc. Amer. Soc. hort. Sci., 1952, 59: 337-42, bibl. 1, illus.

A photomultiplier light intensity measuring unit which can be attached to a commercial flame photometer is described. This unit greatly improves the sensitivity of the original photometer for determining magnesium. Using the same phototube, calcium, potassium, and sodium can also be determined satisfactorily. The direct reading feature of the attachment increases the speed of analysis so that a later repetition of a series of analyses may be made without any loss of total time consumed. [From authors' summary.]

119. WASSINK, E. C., AND VAN DER SCHEER, C.

A spherical radiation meter. [Dutch summary ½ p.]

Meded. LandbHoogeschool Wageningen, 1951, 51 (9): 175-83, bibl. 12, illus., being *Commun. Lab. plant physiol. Res. Wageningen* 97.

A spherical radiation meter, composed of 2 flat barrier layer photo-cells mounted with hemispherical opaline glass covers and 2 iris diaphragms, is described and illustrated. This meter allows estimation of the influx of light into a certain space irrespective of the direction of the flux. The relationship between measurements obtained with this type of meter and with the flat meter is discussed, and its value for plant irradiation purposes is indicated. Plant units with an appreciable vertical extension may be expected to receive light in a manner similar to the spherical meter, whereas units with a mainly horizontal extension receive light like the flat meter. [From authors' summary.]

120. U., K.-E.

Thermotåget—en epokgörande nyhet på fryskonserveringens område. (The rolling deep-freeze—an epoch-making novelty in the freezing industry.)

Fruktodlaren, 1952, No. 4, pp. 103-5.

The first deep-freezing installation on wheels, a Finnish invention, has made its appearance in Sweden. The obvious advantage of this novelty is that it processes perishable fruits on the spot. Two units provide a shuttle service between the place of production and the depot to eliminate bottlenecks. Much is hoped from this new development for the small fruit industry in isolated areas and for the utilization of wild blueberries.

Noted.

121.

a ANON.

Industry's contribution to agricultural research. V. Work of the Royal Dutch/Shell Group.

World Crops, 1952, 4: 171-4, illus.

b ANON.

Industry's contribution to agricultural research. VI. Tilgate Horticultural Station.

World Crops, 1952, 4: 208-10, bibl. 4, illus. The research centre of Messrs. F. W. Berk & Co.

c BISWAS, T. D.

Trace elements in soils and plants.

Sci. & Cult., 1952, 18: 173-8, bibl. 16.

d CHESTERS, C. G. C., AND ROLINSON, G. N.

Trace elements and streptomycin production. *J. gen. Microbiol.*, 1952, 5: 559-65, bibl. 9.

e DARAGAN-SUŠČOVA, A. JU.

Effect of pre-sowing treatment of seeds with biogenic stimulants on the biochemical characters of plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82: 469-72, bibl. 13.

Particulars of biogenic stimulant not given.

f DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, NEW ZEALAND.

Departmental Handbook. The New Zealand Department of Scientific and Industrial Research.

[*Publ. Inf. Bur.*, N.Z. D.S.I.R., 1952, pp. 68, illus.

A reference book on the Department's organization and activities.

- g EMERY, G. A.
Industry's contribution towards agricultural research. X. The Murphy Chemical Company.
World Crops, 1952, 4: 353-6, illus.
- h* FROESCHEL, P.
Le stomatometre. (The stomata measurer.) [Mim. Pap.] 13th int. hort. Congr., London, 1952, p. 1. [summary only in Proceedings].
- i GARNIER, B. J.
A simple apparatus for measuring potential evapotranspiration.
Nature, 1952, 170: 286-7, illus.
- j GIRI, K. V., AND OTHERS.
Proline and hydroxyproline in leaves.
Nature, 1952, 170: 579-80, bibl. 7.
Of citrus and *Santalum album*.
- k GOMEZ-DURAN, E.
Nuevo acondicionador de los suelos. (A new soil conditioner [krilium].)
Agric. trop. Bogotá, 1952, 8 (4): 49-52.
- l HARLEY, J. L.
Associations between microorganisms and higher plants (mycorrhiza).
Annu. Rev. Microbiol., 1952, 6: 367-86, bibl. 96.
- m HEIMANN, M.
Abhängigkeit des Blutungsverlaufes von Beleuchtung und Blattzahl. (The influence of illumination and number of leaves on exudation.)
Planta, 1952, 40: 377-90, bibl. 10, illus.
Work at Göttingen University on decapitated *Kalanchoë blossfeldiana*.
- n HILDITCH, T. P.
The seed and fruit fats of plants.
Endeavour, 1952, 11: 173-82, bibl. 30.
A review of the literature on their composition.
- o HOFMANN, G.
Zur Methodik der Taumessung. (Methods of dew measurement.)
Ber. dtsh. Wetterdienst U.S. Zone 38, 1952, pp. 360-4, bibl. 13.
- p HOWARD, Sir H.
Commonwealth Agricultural Bureaux.
J. Sci. Food Agric., 1952, 3: 385-7.
History, present organization and work.
- q JACOBSON, W. L.
Sprinkler irrigation research in Canada.
Agric. Engng St. Joseph, Mich., 1952, 33: 497-8, 500.
- r JAWORSKI, E. G., AND BUTTS, J. S.
Studies in plant metabolism. II. The metabolism of C¹⁴-labeled 2,4-dichlorophenoxy-acetic acid in bean plants.
Arch. Biochem. Biophys., 1952, 38: 207-18, bibl. 17, being *Tech. Pap. Ore. agric. Exp. Stat.* 699.
For Part I, see *Ibidem* 1951, 32: 249.
- s KORITZ, H. G., AND SKOOG, F.
Colorimetric determination of adenine in plant tissues.
Arch. Biochem. Biophys., 1952, 38: 15-21, bibl. 4.
Work on pea and tobacco plants.
- t KUZIN, A. M., MERENOVA, V. I., AND MAMULI, JA. V.
On the assimilation of [radioactive] carbon dioxide by plant roots. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1952, 85: 645-7, bibl. 1, illus.
Beans were used as test plants.
- u* LAWRENCE, W. J. C.
Seed and potting composts.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, p. 1 [summary only in Proceedings].
- v* LAWRENCE, W. J. C.
The effect of methods of propagation on plant performance.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, p. 1 [summary only in Proceedings].
- w LEWIS, A. H.
Industry's contribution to agricultural research. VII. I.C.I. and Jealott's Hill Research Station.
World Crops, 1952, 4: 247-50, illus.
- x LODKINA, M. M.
On the early phases of development of the stamens of wheats and lilies in connexion with the theory of phasic development. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1952, 83: 613-16, bibl. 11, illus.
- y MINISTRY OF AGRICULTURE, LONDON (GARNER, H. V.).
Manures and fertilizers.
Bull. Minist. Agric. Lond. 36, 10th edition 1952, pp. 98, illus., 3s. 6d.
Very little change since the last edition in 1951 [see *H.A.*, 22: 67].
- z MINISTRY OF AGRICULTURE, LONDON.
Soil sterilization.
Adv. Leaf. Minist. Agric. Lond. 319, 1952, pp. 8.
122.
a NEAL, O. R.
Effects of land resting on conservation and productivity of vegetable-growing soils.
Agron. J., 1952, 44: 362-4, bibl. 16.
Trials indicate benefits.
- b NIČIPOROVIČ, A. A.
Photosynthesis of plants. [Russian.]
Priroda, 1952, No. 4, pp. 37-46, bibl. 1.
- c* NITSCH, J. P.
Test tube fruits. A new technique for investigating fruit physiology.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. ?, illus.
Growth from flowers in culture media.

* See note, p. 3.

* See note, p. 3.

- d NORTH OF SCOTLAND AGRICULTURAL COLLEGE (TINCKER, M. A. H.).
Guide to experiments and demonstrations on Craibstone Farm Grassland Experimental Centre, Muchalls Balnastraid Farm, Dinnet Aldroughy Farm, Elgin Glensauigh Farm, Fettercairn and other centres.
[Publ.] *N. Scot. agric. Coll.*, 1952, pp. 116, illus.
Including collections of fruits and nuts.
- e NOTHMANN, E.
A recording rain gauge.
J. sci. Instrum., 1952, 29: 229-30, illus.
- f ROBERTS, P.
How to make good photos of flowers and plants.
Proc. Fla St. hort. Soc. for 1951, pp. 206-10, illus.
- g SCHNELLE, F.
Klima und Witterung in ihrer Auswirkung auf die Qualität pflanzlicher Erzeugnisse. (The effect of climate and weather on the quality of plant products.)
Landw. Forschung, 1952, 2. Sonderheft, pp. 51-60, bibl. 33.
Plants discussed include fruits, vegetables, medicinal plants and vines.
- h SCHUPHAN, W.
Die Pflanzenzelle als Ausgangspunkt biochemischer Qualitätsforschung, dargestellt an jüngsten Erkenntnissen mit radioaktiven Isotopen. (The plant cell as the starting point of biochemical research into quality, with special reference to recent work on radioactive isotopes.)
Landw. Forschung, 1952, 2. Sonderheft, pp. 28-39, bibl. 36.
- i THERMAN, E.
The effect of indole-3-acetic acid on resting plant nuclei. I. *Allium cepa*.
Suom. Tiedeakat. Toim. Biol. 16, 1951, pp. 40, bibl. 76, illus.
- j TRUDOVA, R. G.
The effect of röntgen rays on root formation in bean cuttings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1952, 85: 429-32, bibl. 7, illus.
Very little, apparently.
- k TURNER, J. S.
Photosynthesis.
Rev. pure appl. Chem., 1951, 1: 214-34, bibl. 79.
- l WARREN, R. L.
A flame photometer for routine biochemical use.
J. sci. Instrum., 1952, 29: 284-6, bibl. 3, illus.
Designed primarily for determining Na and K.
- m WEST OF SCOTLAND AGRICULTURAL COLLEGE.
Guide to Auchincruive.
[Publ.] *West of Scotland Agricultural College*, 1952, pp. 56.
- n WIERSUM, L. K.
Enkele moderne inzichten over functie en bouw van de wortel in betrekking tot zijn milieu. (Some modern views on the function and structure of the root in relation to its environment.)
Bergcultures, 1952, 21: 81-5, 113-16, bibl. 28, illus.
A review of the literature.

TREE FRUITS, DECIDUOUS.

General.

(See also 2, 3, 19-22, 122d, 285a, f, g, n, q, t, 515, 1377, 1390, 1392, 1421.)

123. COMMONWEALTH ECONOMIC COMMITTEE.
Fruit. A summary of figures of production and trade relating to fresh, canned and dried fruit, and wine.
[Publ.] *Commonw. Econ. Cttee*, 1952, pp. 144, H.M. Stationery Office, 5s.

This review, which is issued annually, contains tables and summaries of production by countries and international trade during the war and post-war periods of the following commodities: apples, pears, plums, cherries, peaches, apricots, grapes, pineapples, oranges, grapefruit, lemons, bananas, canned fruits, raisins and currants, dried tree fruits and wine. Special reference is made to countries of the British Commonwealth. There are appendixes on import duties and trade regulations, and on government measures affecting the import of fruit into the United Kingdom.

124. MINISTRY OF AGRICULTURE, LONDON.
Orchard fruit census—January 1951. England and Wales.
[Publ.] *Minist. Agric. Lond.*, [1952], pp. 3.

These tables show, by counties, the acreages and number of trees under 7 years old, and 7 years old and over, of the following groups: dessert apples (Cox; Worcester; Laxton's Superb; all other dessert apples); cooking apples (Bramley's; Early Victoria, Grenadier and Lord Grosvenor; all other cooking apples); pears (Conference; Laxton's Superb; all other pears); plums (Victoria; gages and gage plums; damsons; all other plums); cider and perry fruit (cider apples; perry pears); cherries (sweet cherries; sour cherries); all other top fruit including nuts; and total orchard fruit.

125. MICKLEM, T., AND KRIEL, P. E.
The deciduous fruit industry in the western and south western Cape Province.
Bull. Dep. Agric. S. Afr. 321, 1952, pp. 56, bibl. 5.

A survey undertaken with a view to correcting past mistakes in choice of fruit varieties and establishing a sound planting programme showed that canning fruits, which are grown mainly for the home market, have in general been more heavily planted than export fruits, and that bigger production increases are to be expected in canning and drying fruit than in dessert fruit. The most commonly planted species are apricot, peach, apple,

pear, prune, plum. Tables give the chief varieties among other data.

126. KNUTH, COUNT.

The South American apple industry.*

Fruit Year Book, 1953, 1952, pp. 30-7, illus.

The main apple-growing countries of South America are Argentina and Chile. The largest apple district of Argentina is in the Rio Negro valley where irrigation is practised over 130,000 acres. Orchards average 25 acres and are intensively cultivated. Normal yields are 400 bushels to the acre. In Mendoza Province there is another apple-growing area at 4,000 ft. in the Andes. Here the industry was established much more recently and the orchards, which are mostly large, are 15 years old or younger. Irrigation is practised. In both districts codling moth and red spider are serious pests. Delicious and its red sports cover 60% of the total area under apples in Argentina and other important varieties are Jonathan, King David, Rome Beauty, Granny Smith, Winesap and Yellow Newtown. The Chilean orchards lie chiefly between 35° and 38° south, where irrigation during the growing period is necessary. Yields of 60-80 bushels per acre are considered good. As in Argentina scab is practically unknown, but canker is a problem. The same varieties are grown as in Argentina but the old American Hoover still provides 30% of production. Both countries produce large apples by European standards, averaging 113 per bushel.

127. HARRACH, G.

Wohin, deutscher Obstbau? (Fruit growing in Germany.)

Mitt. dtsh. landw. Ges., [1952 ?], Vol. 67, No. 15.

In 1951 there were 88.5 million bearing fruit trees in Western Germany, half of them being apples and 17.5 million plums and zwetschen. The number of pear, sweet cherry, sour cherry and peach trees was between 3 and 4 million each. Consumption exceeds production and quality still leaves much to be desired. A reorganization of the industry on the Swiss model is called for. O.J.

128. HERRERO, J.

Tree fruit growing in Spain.

Fruit Year Book 1953, 1952, pp. 50-63, illus.

Olives and vines are the crops which occupy the largest acreages. The relative importance of some others on the basis of the total number of trees is almond, orange, banana, fig, hazelnut, apple, chestnut, peach, pear, plum. Vines and olives are virtually grown only on unirrigated land, and citrus and bananas only on irrigated land. Where rainfall is low pome and stone fruits are grown where irrigation is available. All crops are grown chiefly for the local market. Only banana, citrus and olive are generally managed on a commercial basis and, unlike most others, are chiefly grown as single crops. In single-crop culture clean cultivation is the usual practice. Cover cropping is rare. Vines are chiefly grown in central Spain and on the E. Mediterranean coast, 94% of the crop going for wine making. The chief varieties are listed. Since the phylloxera invasion control has chiefly been by the use of American *Vitis* spp. and their interspecific hybrids, but their adaptation to soils with a high lime content (very common in Spanish vineyards) is a problem. Olives. Andalusia and the Mediterranean

* See also H.A., 22: 2127.

coast are the chief commercial growing areas. 97% of production goes for the manufacture of oil, the national cooking fat, and oil and green pickled olives are both very important export items. The chief varieties are quoted. Propagation is mainly by cuttings and suckers but some varieties are grafted on wild seedlings or on rooted cuttings of other varieties. *Nuts*. Almonds are the most important and are found chiefly in Alicante, Murcia and the Balearics. Bitter almond seedlings are generally used as rootstocks. Hazel-nuts are grown chiefly in Tarragon and chestnuts chiefly in the north-west. *Citrus*. The chief species are sweet and sour orange, mandarin and lemon. The chief commercial areas are on the Mediterranean coast, centred on Valencia. The chief sweet orange varieties are Washington Navel, Cadenera, Comuna, Sanguina, Verna and Late Valencia. Sour orange is the rootstock most commonly used. *Bananas* are mainly grown in the Canaries, the chief variety being the dwarf, *Musa cavendishii*. *Apples and pears* are mainly grown in NW and NE Spain, the apple centre being Oveido where a cider industry flourishes and the pear centre Zaragoza. Little attention has yet been paid to the study of varieties. Cider apple seedlings are largely used as commercial rootstocks; clonal rootstocks are not yet used on a commercial scale. For pears, seedlings, which are difficult to get, are preferred as rootstocks, but quince seedlings are more commonly used. *Peaches* are chiefly grown in Barcelona Province. The number of commercial varieties is high and a collection has been started to study and standardize them. Yellow-fleshed clingstones are the most popular type. Peach and, in the more arid areas, almond seedlings are used as rootstocks.

129. OREGON STATE COLLEGE.

Oregon's tree fruit and nut crops 1910-1949.

Ext. Bull. Ore. State Coll. 700, 1950, pp. 30 [received 1952].

The chief crops covered by this statistical yearbook are apples, cherries, peaches, pears, prunes, filberts and walnuts.

130. SOKOLOV, G. A.

Forest orchards of Tavrid [Crimea]. [Russian.]

Priroda, 1952, No. 6, pp. 88-97, illus.

Edible fruits, berries and nuts growing in the woods and forests of Crimea include Cornelian cherry, wild pear and apple, rose (hips), barberry, strawberry, raspberry, hazel nut, walnut, beech nut and juniper, all valuable, particularly for the preserving industry. Apart from the systematic collection of these forest products, planting of apricots and peaches, often intermixed with long-lived fruit trees such as pears, is carried out in forest clearings and on terraced hillsides. An account is given of a large scale improvement scheme in which varieties of apples and pears are worked on wild species growing in suitable locations. Walnuts are among the most valuable forest crops and an investigation was conducted on some 30,000 trees, of which 400 specimens were selected for propagation and further studies. New suitable varieties of pistachio, apricot, fig, plum and olive are also planted on terraced slopes hitherto bare or covered with saplings. Advice on pest control in these forest orchards is given mainly by the Crimean branch of the Academy of Science, S.S.S.R. Other institutes actively engaged in the improvement of fruit production of the peninsula

include the Maikov Experimental Station and Nikitskii Botanic Garden.

131. HANNIGAN, M. A.

The apricot.

Qd agric. J., 1952, 75: 17-20, illus.

In Queensland the Granite Belt and Warwick districts are the only areas where apricots are grown commercially, the latter being the more suitable climatically. Only a limited number of varieties have proved suitable. The most widely grown are Newcastle, Trevatt, Moorpark, Tilton, Oullins, Mansfield Seedling, and Glen-garrie. Their chief characteristics are given. Soil and climatic requirements and orchard operations in Queensland are described. The whole crop is sold on the fresh fruit market.

132. DELMAS, H. G.

Quelques aspects de la culture de l'abricotier en France. (Some aspects of apricot growing in France.)

Fruits d'Outre Mer, 1952, 7: 261-70, 311-23, bibl. 51, illus.

Among subjects discussed are the most common varieties (chiefly Luizet at 5×5 m. in S.E. France and Rouge de Roussillon at $6-8 \times 6-8$ m. in E. Pyrenees) and rootstocks, cultural problems (including manuring and pruning) and parasitology.

133. BONNIOL, J., AND BERVILLÉ, P.

La culture de l'abricotier dans le Languedoc. (Apricot growing in Languedoc.)

Progr. agric. vitic., 1952, 138: 303-7.

In Languedoc the best rootstock is the seedling apricot, but Reine-Claude plum seedlings are used on damp sites and bitter almond seedlings on dry calcareous sites. Manurial requirements and control of monilia and capnodis beetle are discussed. Important varieties are Bullida, Rouge de Roussillon and Polonais.

134. HESSE, C. O., AND OTHERS.

Apricot culture in California.

Circ. Calif. agric. Exp. Stat. 412, [1952], pp. 57, bibl. 13, illus.

California produces 85% of the apricots grown in the U.S.A. and 35-40% of the world's total supply. The bulk of the crop is dried or canned, and the varieties used almost exclusively are Royal, Blenheim and Tilton. Information is given on climatic and soil requirements, varieties, establishing an orchard (including irrigation systems and choice of rootstocks), management (including frost protection and fruit thinning methods), diseases and pests, and harvesting and handling for the fresh fruit, canning and dried fruit markets.

135. WARD, K. M.

The peach.

Qd agric. J., 1952, 74: 323-34, illus.

In Queensland, the peach is grown commercially mainly in the Stanthorpe area and also, to a small extent, in coastal districts near Brisbane. As it is grown solely for the fresh fruit market attention has been given mostly to dessert varieties; these may be classified into temperate and sub-tropical groups, and the chief varieties grown are briefly described. The sub-tropical varieties include China Flat, Bell's November, Beauty of Booroodabin, Watt's Early Champion, and a dwarf peach. The growth cycle and the cultural and plantation

operations, including harvesting and packing, are described.

136. WHITTAKER, E. C.

Pear growing in New South Wales.

Agric. Gaz. N.S.W., 1952, 63: 132-4, 183-7, 241-7, 310-14, illus.

The D6 selection of *Pyrus calleryana* appears at present markedly superior as a rootstock to *P. communis*, the present main general purpose stock, and may gradually displace it. As regards soil management it is recommended that once the trees have begun to bear, inter-row cropping should cease and either cultivation should be reduced to the minimum necessary to control weed growth in the drier months or, in the highland areas, subterranean clover should be grown throughout. Varieties recommended for commercial planting are Josephine de Malines, Packham's Triumph, Williams Bon Chrétien, Beurré Bosc, Winter Cole and Winter Nelis.

137. WARD, K. M.

The plum.

Qd agric. J., 1952, 75: 7-16, illus.

European (*Prunus domestica*) and Japanese (*P. salicina*) plums are grown commercially in Queensland mainly in the Stanthorpe district. The fruit is nearly all sold on the fresh market in Queensland and the southern States. The annual growth cycle and the chief varieties of these two classes are briefly described, as are soil requirements and orchard operations.

Breeding and varieties.

(See also 14, 285d, h, i, j, x, 665, 666, 1381, 1393.)

138.* CRANE, M. B.

The genetics and breeding of fruit trees.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 12.

Breeding experiments with fruit trees have been mainly carried out in the search for new forms of commercial value, and usually the families raised for this purpose have been small. Large families are, however, desirable both for practical results and for genetic study. Their genetic complexity, maintained by vegetative reproduction, and the length of time which elapses from seed to maturity and from one generation to another, make the breeding of fruit trees prolonged. But apart from this the impact of genetics on fruit tree breeding has not been so profound as expected by early geneticists. This is mainly because their most important characters, such as resistance to pests and diseases, size, shape, colour and quality of fruit, are quantitatively inherited and our knowledge of the inheritance of such characters has been limited. In the diploid fruits, many characters are discontinuous and simply inherited, but as a rule, even in these, the inheritance of those characters which go to make up fruit quality is complex. In the polyploid fruits continuous variation is almost the rule, and results from the cumulative action of a number of genes. Study of the inheritance of such characters, polygenic characters as Mather has called them, is further complicated by variability being dependent on both genotype and environment; in fruit trees, environment both natural and cultural such as the use of different rootstocks, etc., has profound effects. With such characters as size and shape of fruit it is common to find in the progeny a

* See note, p. 3.

pronounced shift towards the characters of the wild type. Although selection for desirable characters in fruits has been going on for centuries it has been much slower than in crops normally raised from seed, and in some ways it has been further impeded by vegetative reproduction. [Author's summary.]

- 139.* GRANHALL, I.
Aims, methods and results of Swedish fruit tree breeding.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 4, bibl. 10.

A Scandinavian Advisory and Co-operative Council has recently been appointed to Balsgård, where breeding of fruit tree varieties has been in progress since 1942. The main method at the institute is cross-breeding with comprehensive selection. Several promising new types of apples, pears, plums and cherries are under preliminary trial. In order to improve the chances of finding valuable apple seedlings, mass production of triploids from crosses between current diploid varieties and new tetraploid types has been accomplished. The possibilities of polyploidy breeding are also investigated and utilized in other fruit species. By means of several different agents, e.g. X-rays, neutrons, and radioactive isotopes, mutation research has been carried out at the institute since 1944. About a dozen mutations have been recorded in these experiments, mostly referring to the colour and russetting of the fruits.

140. EINSET, J.
Spontaneous polyploidy in cultivated apples.
Proc. Amer. Soc. hort. Sci., 1952, 59: 291-302, bibl. 2, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* 882.

The comparatively rare occurrence of wholly or partially polyploid apples in large seedling populations from diploid and triploid parents is indicated, and a description is given of the stem structure and behaviour of diploid-tetraploid periclinal chimaeras that sometimes occur spontaneously as large-fruited sports of diploid varieties.

141. LIEBSTER, G.
Stand und Problematik der Qualitätsbeurteilung beim Obst. (The assessment of quality in fruit.)
Landw. Forschung, 1952, 2. Sonderheft, pp. 79-87.

The author pleads that breeders should include high vitamin C content among the desirable characteristics of fruits. A reference to vitamin C content should be incorporated in every variety description.

142. MAURER, K. J.
Die Obstsorten. Konstitutionsforschung als moderne Sortenkunde. (Fruit varieties. Constitutional research as the basis of variety descriptions.)
Schriftenreihe AID† 19, 1952, pp. 18.

In this stimulating article, the author, who is Professor of Pomology at Geisenheim, contends that the conventional description of fruit varieties follows an old tradition which was originated by amateurs for amateurs at a time when the commercial fruit grower did not yet exist.

* See note, p. 3.
† Land- u. hauswirtschaftlicher Auswertungs- u. Informationsdienst, Frankfurt/Main.

Hence, no consideration is given to the questions which a professional would ask to-day and which can be answered only by experiment, viz. How does a certain variety thrive in different areas? Which rootstocks and stem builders are compatible? What is its performance on different soils? What is the most suitable shape of tree? etc. In other words: A modern variety characterization should not be merely descriptive but it should include experimental data on its constitution, i.e. its genetical response to a range of environmental factors. Of the many examples cited for the effect of environmental factors on the performance of a variety in different localities only a few may be quoted to illustrate the trend of Maurer's thought: In the Rhine Valley late apples are ready to be eaten as soon as they are picked, while a little higher up in the adjacent Odenwald they require 2-3 months' storage. The discussion of rootstock effects includes the extraordinary improvement in the colouring of peaches induced by the use of almond seedlings at Geisenheim, as compared with Ackermann and other rootstocks, and the inducement of greater mildew resistance in apple varieties by E.M. IX as shown by M. Zwintscher (*Obstbau*, 1951, pp. 134-5). For some varieties soil conditions seem to be more important than other factors, the Kaiser Wilhelm apple, for instance, growing as well on the Vistula as in the Rhine Valley, provided the soil is heavy. While certain varieties, such as Cox's Orange, Delicious and Jonathan, are relatively cosmopolitan, others require a more specific, coastal or continental climate. McIntosh, for instance, is in the dessert class in New York State and a failure at Geisenheim, but again in the continental climate of Sinoleka, Poland, its quality equals that of Cox's Orange. Antonovka is a good keeping variety of satisfactory flavour in central Russia and northern Sweden, whereas at Geisenheim harvesting maturity in August coincides with eating maturity and the quality is poor. There are varieties to suit almost every type of locality. If we knew more about the interaction of genetical and environmental factors we could predict the success that is likely to attend the cultivation of a particular variety in a given area. A real advance in constitutional research can be brought about only by experimentation on an international scale. For this the author pleads.

143. DE SONNAVILLE, P.
Mutaties in het grote fruit. (Mutations in tree fruits.) [English summary 9 lines.]
Meded. Inst. Vered. Tuinbouwgew., 17, 1950, pp. 77-82 [omitted in error from *H.A.*, Vol. 21].

Mutations in tree fruits in Holland and other countries are described. Red sports have been observed in Holland of the apple and plum varieties Zoete Kroon, Bloemeezoet, Keuleman, Boskoop, Eisdener Klumpke, Jonathan, Reine Claude d'Oullins and Jefferson. A Reine Claude d'Oullins with large yellow fruits ripening about 10 September and a Saint Remy with long and broad fruits on the same tree have been found.

- 144.* POTTER, J. M. S.
New varieties of fruit in the United Kingdom.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6.

The author after discussing what is meant by the term

* See note, p. 3.

"new" as regards different kinds of fruit, and the origin of new varieties and methods of estimating value, gives brief descriptions of a few new varieties of some of the chief English fruit species.

- 145.* VAN CAUWENBERGH, E.
Comportement et appréciations de variétés fruitières essayées récemment en culture commerciale en Belgique. (The behaviour of fruit varieties recently introduced into Belgian orchards.)
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 8.

Methods whereby new fruit varieties have come into the commercial orchards in Belgium are discussed. Outstanding introductions from England, U.S.A., and resulting from selections in Belgium are listed.

- 146.* KRISTENSEN, R.
New varieties of fruit and vegetables introduced in Denmark during recent years.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 9.

Danish work is described and varieties of apple, plum and cherry which have proved useful are discussed. Main centres of research are Blangstedgaard and Spangsbjerg. Notes are also given on a number of new vegetable varieties.

- 147.* COUTANCEAU, M.
Impressions sur le comportement des variétés de pommiers d'origines étrangères introduits en culture en France depuis 1930. (The behaviour of foreign apple varieties introduced into France since 1930.) [English summary $\frac{1}{2}$ p.]
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 12.

Varieties which have done excellently are Golden Delicious and Red Delicious, others which are known to do well under certain conditions are Stayman Wine-sap, Winter Banana and Jonathan. Reports are given on a number of other hitherto less successful varieties.

148. (GREIG, A. M. W.)
Variety planting of apples and pears.
Orchard. N.Z., 1952, 25(6): 13.

Percentages and trends in apple and pear variety plantings have been compiled by the Director of Horticulture, New Zealand. Of the Dominion total of approximately 51,000 non-bearing apple trees 23.9% were Granny Smith, 12.5% Golden Delicious and 11.3% Gravenstein. Apple trees reworked during the past two years showed the same variety trends. In 1950, of a total of approximately 15,000 non-bearing pear trees 89% consisted of the three varieties: Bartlett (62.4%), Pack-ham's Triumph (15.4%) and Winter Cole (11.4%).

149. TUNEU, R.
Variedades de frutales para el Uruguay.
(Fruit varieties for Uruguay.)
Publ. Minist. Ganad. Agric. Montevideo 103, 1952, pp. 16.

Short notes are given on the species and varieties shown by research to be suitable for commercial growing in Uruguay for local consumption and possible future

export. Species included are cherry, plum, citrus, peach, fig, apple, quince, walnut, chestnut, olive and pear.

150. HRUBÝ, K., AND OTHERS.
Zhodnocení proměnlivosti Panenského jablka v Čechách a na Moravě v roce 1950. (Variability of the Panenské (Maiden) apple in Bohemia and Moravia in 1950.) [English and Russian summaries $\frac{1}{2}$ p. each.]
Sborn. čes. Akad. Zeměd. 1952, 25: 5-12, bibl. 5, illus.

The variability in size, shape, colour, resistance to scab and to codling moth, and storage quality of 192 samples of Maiden apple, collected from 140 localities, has been investigated. A positive correlation was found between the altitude at which the apples were grown and keeping quality. Trees which produced the best 18 samples have been selected for further study and propagation.

151. ZWINTZSCHER, M.
Zwei neue Steinobstsorten: "Primavera" und "Magna Glauca". (Two new stone fruit varieties: Primavera and Magna Glauca.)
Dtsch. Baumsch., 1952, 6: 183-8, illus.

The 25 years' breeding work and observation preceding the release of the two varieties was begun at München-berg and then continued at the Max-Planck-Institut, Voldagsen. Primavera is a very early sweet cherry variety of high quality which proved relatively hardy in the winter of 1939/40. The chief merit of the fairly early, large-fruited plum variety Magna Glauca is its excellent quality. The two varieties are described for the first time in this article.

152. STEYN, P. A. L.
The new peach varieties—Van Riebeeck and Culemborg.

Decid. Fruit Gr, 1952, 2(3): 5-6, 18, illus.

Breeding early peach varieties resistant to delayed defoliation began at the Western Province Fruit Research Station in 1942. Two Babcock \times Early Dawn hybrids, the first that have been produced in South Africa by planned breeding, are now being distributed. Van Riebeeck is a white-fleshed freestone and ripens in the second half of December. Culemborg is a white-fleshed semi-freestone with a tendency to overbearing and ripens early in December. Both store well.

153. DE WET, A. F.
The origin of the Kakamas peach. Its influence on the South African fruit-canning industry.

Fmg S. Afr., 1952, 27: 347-50, bibl. 6, illus.

An outline is given of the development of the South African fruit canning industry. The past decade has shown a large increase in output particularly in peaches. Among peach varieties grown for canning, the only native selection, Kakamas, has been largely responsible for the expansion and now represents over 75% of the clingstone trees planted. The variety, which was a chance seedling of the St. Helena or Transvaal yellow peach, is described, and yield and fruit size data are tabulated from a 4-year trial at Bien Donné in which it outyielded 7 other varieties, including Pullar's Cling.

* See note, p. 3.

154. DE WET, A. F.

Three new canning-peach varieties.

Fmg S. Afr., 1952, 27: 391-3, bibl. 1, illus.

Following the selection of the Kakamas peach [see preceding abstract] a collection of over 2,000 seedling and grafted trees was established at Elsenburg. From these 3 other yellow clingstone varieties of the St. Helena or Transvaal yellow type were selected and named Keimoes, Maluti and Tokane. They are compared briefly with Kakamas with respect to yield, quality and time of ripening. Their introduction will extend the picking season considerably.

155. LESLEY, J. W., AND WINSLOW, M. M.

Peach varieties for a warm winter climate.

Circ. Calif. agric. Exp. Stat. 406, 1952, pp. 7, bibl. 4, illus.

Brief notes are given on the characters, including winter chilling requirements, of 8 freestone and 1 clingstone peach varieties. For the intermediate zones of southern California the varieties requiring somewhat longer chilling are recommended, while in the coastal belts where there is much less danger from spring frosts, and at higher elevations where colder spring weather tends to delay blossoming sufficiently to escape frost, the very short-chilling varieties may be planted with safety.

156. SMYKOV, V. K.

A study on the winter hardiness of quinces at Mičurinsk. [Russian.]

Doklady vsesojuz. Akad. sel'sk. Nauk, 1952, 17 (9): 15-18, bibl. 5, illus.

Observations were made on the frost resistance of a number of quince varieties under heavy snow cover during the very severe winters of 1949-50 (average January temperature -18.2°C ., minimum -38.5°C .), and 1950-51 (average February temperature -16.5°C ., minimum -40°C .). Additional laboratory observations were made in 1951 on the hardiness of their root systems. In both laboratory and field tests the variety Severnaja Mičurina [Mičurin's Northern] and its seedlings were found to be the most frost resistant of the quinces, their hardiness approaching that of wild apples.

Propagation and rootstocks.

(See also 254, 285r, 398.)

157. FLOOR, J., AND OTHERS.

Zeventien korte artikelen voor boomkwekers. (Seventeen short articles for nurserymen.)

Boomkwekerij, 1948 and 1949, reprinted as *Meded. Inst. Vered. Tuinbouwgew.* 18, 1950, pp. 39 [omitted in error from *H.A.*, Vol. 21].

These 17 articles cover various aspects of nursery propagation work. Floor deals with the quince and frost susceptibility, imported quinces, Crab C, seedling rootstocks, intermediate stems, Redcoat Grieve, Laxton No. 1 and Laxton Perfection, Myrobolan B cuttings, layering, and earthing-up. Other workers describe promising new apple varieties, some new pear varieties, the raspberry varieties Leendertz and Improved Pruisen, Malling Enterprise, Malling Land-

mark, and Malling Promise, budding peaches, and the propagation of gooseberries by cuttings.

158. FLOOR, J.

Inleiding excursie "Boomkwekerij". (An introduction to nursery work.)

Meded. Inst. Vered. Tuinbouwgew. 17, 1950, pp. 40-3, illus. [omitted in error from *H.A.*, Vol. 21].

The programme of research at Wageningen on propagation, stock-scion incompatibility and breeding for fruit tree rootstocks is outlined, with particular reference to stem cuttings, root cuttings, and layering. In a trial with Myrobolan B and St. Julien A plum cuttings about 70% rooting was obtained. With root cuttings of the cherry rootstock F12/1 there was 84% success.

159. PADFIELD, C. A. S.

Materials suitable for use as grafting mastics.

N.Z. J. Sci. Tech., Sect. A, 1952, 34: 179-85, illus.

Various wound dressings based on petroleum grease with and without hormones, bitumastic compounds, petroleum wax emulsions with and without hormones, a rubber latex and a grease-impregnated linen tape were compared in a 40-50-year-old Dougherty apple orchard, being top-worked to Granny Smith. Bituminous compounds proved the most satisfactory. Inclusion of 0.1% of IAA, IBA or NAA in grease increased callus growth but not to the point of inducing wounds 2 in. in diameter to heal in one season. Adding hormones to wax emulsions did not improve their performance. All materials gave a commercially satisfactory "take" except 0.5% NAA, which completely inhibited scion growth. There was no evidence that hormones were translocated from one leader to another [see also *H.A.*, 22: 3405].

160.* BEAKBANE, A. B.

Anatomical structure in relation to rootstock behaviour.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 10, figs 2.

A description is given of the relation between the anatomy of apple rootstocks and their influence on the growth and fruiting of scion varieties. The proportion of bark to wood in the lateral roots of clonal apple rootstocks has been found to be related to the effect of the rootstocks on size of tree at maturity, rootstocks with a large amount of bark being the most dwarfing in their effect. The proportion of living tissue in the wood of the roots is most nearly related to tree size and fruitfulness in the first few years after grafting; rootstocks with much living tissue induce moderate growth in the early years and precocious fruiting in scions grafted on them. The extent and nature of the variation in structure due to environment and other factors are described. Reference is made to the reports giving the data on which these conclusions are based. Anatomical studies on the following subjects are briefly noted; mechanical strength of rootstocks, stock/scion compatibility, and tap root structure in seedlings. The relation between the anatomical structure of rootstocks and the physiological and biochemical processes which

* See note, p. 3.

affect tree growth and fruiting is discussed. [Author's summary.]

161. LJONES, B.

Samhøvet mellom fruktsortar og grunnstammer. (Compatibility between fruit varieties and rootstocks.)

Frukt og Baer, 1952, 2: 5-15, bibl. 4, illus.

In the course of a study of incompatibility the author examined about one hundred trees of apple, pear and plum which had died from that cause. This preliminary account is accompanied by 18 photographs of unions and microphotographs of root sections.

162.* PRESTON, A. P.

Some new apple rootstocks.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 20.

The need for improvement in apple rootstocks is outlined. Some results from field trials of a new series of rootstocks are presented together with their parentage and place of origin. This series, the Malling-Merton series, was specially bred for resistance to woolly aphid by members of the staffs of the John Innes Horticultural Institution and East Malling Research Station. The trials include sixteen new rootstocks together with some Malling ones, Northern Spy and Ivory's Double Vigour for comparison. The scion varieties are Cox's Orange Pippin, Ellison's Orange and Jonathan. They are planted on three widely different soil series including loam, sand and clay soils. Data are presented on trunk girth, fruit set, fruit yield, anchorage and suckering propensity of trees on the new rootstocks. Some of them have, during their first seven years, shown improvements over existing rootstocks of similar vigour. The propagation qualities of the rootstocks when stooled are given. Botanical descriptions of the new rootstocks are being prepared. The behaviour of the new rootstocks, relative to existing ones, on the various soils is discussed. [Author's summary.]

163. GLEASON, B. L., AND O'ROURKE, F. L.

Tests on peach rootstocks.

Amer. Nurserym., 1952, 96(5): 10, 45-7.

The claim that seedlings of peach trees which escaped from cultivation in the colonial days are more vigorous and provide better rootstocks than cultivated seedlings seems to be supported by experimental data obtained in a Michigan nursery. Seed from a red-leaved sport of a natural produced considerably more vigorous plants than Lowell seed, and when both were budded with Elberta a better stand and larger trees were obtained on Redleaf. In another series of trials of 15 varieties budded on Lowell rootstock, Redleaf showed the highest rate of survival. It is recognized, however, that the contrasting colour of Redleafs, used in these tests both as rootstock and budwood, improved the efficiency of sprouting operations and contributed towards the high survival rate. [A very favourable note is given of the use of the Kingston Red Leaf as a rootstock, *Ibidem*, 96(4): 30. It is compatible with peach, plum and apricot, has a fibrous root system and produces large trees. The red colour of shoots helps in disbudding. The seeds germinate well.]

* See note, p. 3.

Growth phenomena

(See also 285m, 1386, 1388.)

164. *ROGERS, W. S.

Fruit plant roots and their environment.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7, bibl. 19.

The results of studies on fruit plant roots, including apple, pear, plum, black currant, gooseberry and raspberry are discussed. It is shown that age and variety of plant, and soil factors such as texture nutrients, aeration, moisture and temperature all contribute to the behaviour of the root system, which in turn largely controls the tree performance. The constant branch: root weight ratio found in apple, irrespective of size of tree, illustrates the inevitable effect of all branch treatments on the root, and *vice versa*. The wide and deep distribution of absorbing roots throughout the soil block suggests that fertilizers should be spread over the whole soil area and explains why they may take a long time to show their full effect. Root competition of closely-planted trees and of trees and cover crops is discussed. The plant or rootstock should be chosen to suit the soil. Root studies help in this choice and also show how soil factors can be improved by cultivation measures such as manuring, cover cropping, irrigation and drainage. Papers reviewing these results more fully are quoted. [Author's summary.]

165. *BREVIGLIERI, N.

Studies on the root system of fruit trees and vines in Italy.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 22.

An account is given of the author's investigations in the valley of the Po on the roots of apple, peach, cherry and pear trees and of vines grown in association with them, using a modified form of English methods. His findings with all these crops are given in considerable detail.

166. *BARLOW, H. W. B.

The importance of abscission in fruit production.

[*Mim. Pap.*] 13th int. hort. Congr., London, pp. 12, bibl. 26.

1. The anatomy of the abscission process is outlined, and examples given to illustrate the unity underlying various "types" of abscission. 2. A hypothesis is presented to account for the control of abscission by growth-substances, in which it is suggested that an enzyme system causing pectic breakdown is activated by ethylene and inhibited by growth-substances. 3. Evidence for these views is briefly surveyed. 4. Ways in which the growth-substance balance might be disturbed are considered. 5. Shedding in the apple, from flower to mature fruit, is considered against the general background previously presented, with particular reference to the use of anti-drop materials as thinning agents. [Author's summary.]

167. SCHANDER, H.

Untersuchungen über umweltbedingte Eigenschaften des Samens und Keimlings von Apfel und Birne. (The influence of environment upon seeds and seedlings of apple and pear.)

Angew. Bot., 1952, 26: 165-80.

* See note, p. 3.

A wealth of data is presented in tables and diagrams to show that, with apple and pear, seed weight as well as physiological properties of the seed and seedling—such as germination percentage, vigour of germination and growth during the first season—are largely influenced by environmental conditions. Following Noack's terminology the author distinguishes between topogenic effects (size of fruit, number of seeds in the fruit, position of the fruit on the spur and on the tree, number of leaves per fruit, etc.), cyclogenic effects (age of tree, biennial bearing, etc.) and perigenic effects (environmental conditions of the tree itself, such as locality, climate and nutrition). A particularly close relationship was found to exist between seed weight and topogenic influences. Sorting by air stream made it possible to select the best seed for use in the nursery. The study was carried out on varieties known to be good sources of seed for the raising of rootstocks.—Hochschule für Gartenbau, Hanover.

168. MENDES, B.

Observações sobre ritmo endonómico vegetal em Portugal e suas colónias. II. . . (Observations on the endonomic rhythm in plants in Portugal and her colonies. II. Unusual internal flowering rhythm in *Pirus malus*.) [in English].
Portugal. Acta biol., Ser. A, 1951, 3: 235-8, bibl. 8, illus. [received 1952].

The causes of changes in flowering rhythm in different parts of the same apple tree are discussed.

169. MARTIN, D., AND LEWIS, T. L.

The physiology of growth in apple fruits. III. Cell characteristics and respiratory activity of light and heavy crop fruits.
Aust. J. sci. Res., Ser. B, biol. Sci., 1952, 5: 315-27, bibl. 9.

Cell size, total and protein nitrogen, and preclimacteric respiration have been studied for light and heavy crop fruit of certain Tasmanian-grown apple varieties. Differences in size of fruit from light and heavy crops have been shown to be due mainly to differences in cell size rather than in cell number. Respiration per cell, protein nitrogen per cell, and cell volume were closely inter-correlated but respiration per unit protein is greater in light crop fruit than in heavy crop. It is suggested that the more rapid senescence and susceptibility to storage disorder of light crop fruit may be related to its higher respiration per unit protein. Though protein synthesis keeps pace with cell enlargement, the respiration per unit protein increases with cell size. No consistent correlation was found between cell characters of a variety, such as cell size and cell number, and physiological characters such as period or date of maturation. Attempts to raise the mean fruit size without impairing keeping quality are most likely to succeed if cell number per fruit is increased and cell size is kept small. [Authors' summary.]—C.S.I.R.O., Hobart.

170. THUESEN, A.

Aebetraer og bladareal. (Apple trees and leaf area.) [English summary $\frac{1}{2}$ p.]
Horticultura, 1952, 6: 33-7.

The relation between leaf area and biennial bearing in the Gravenstein apple variety was studied in ten 14-year-old trees, six of which had their on-year in 1950

(L) and four in 1951 (U). For both groups data are tabulated on: (1) Flowering and crop; (2) average weight and area of a single fruit spur leaf; (3) total area of fruit spur leaves; (4) total leaf area of vegetative shoots; (5) total area of all leaves, and (6) dry matter production in 1951 (for 3 trees only). From these data the author draws the following conclusions: The average area of a fruit spur leaf was considerably larger in the off-year; the total leaf area on vegetative shoots was larger in the on-year as there were more shoots and leaves per shoot than in the off-year; the total area of all leaves was larger in the off-year; dry matter production in the above-ground parts was not influenced by the crop. Some of these conclusions do not fully confirm conclusions 1 and 3.—Spangsbjerg Research Station.

171. NESDAL, O.

Reproduktive knoppar hos frukttre. (Dormant and adventitious buds in fruit trees.)

Frukt og Baer, 1952, 2: 78-81, bibl. 6, illus.

Regeneration in pome fruit from dormant and adventitious buds is discussed. The anatomy of the buds is illustrated by cross sections made at various developmental stages.

172. KOLOMEC, I. A.

Biological analysis of the development of apple flower buds. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 84: 821-4, bibl. 2, illus.

From experiments carried out at the Ukrainian Institute of Fruitgrowing (Kiev) it is concluded that, during the cycle of development of apple flowers, the tissues of the growing points on the stem require different nutritional treatment at different stages. Not only is the composition of the nutritive substances passing into the meristematic cells important, but also their concentration. In the early period of development the meristem in the flowers requires a higher concentration than that needed by vegetative buds. In the second phase the sap is at a concentration lower than that necessary for the formation of vegetative organs.

173. CARLONE, R.

Ricerche sulla differenziazione delle gemme nel melo. Nota preliminare. (Research on bud differentiation in the apple. A preliminary note.)

Riv. Fruttic., 1952, 14: 138-46, bibl. 15, illus.

Investigations in 1950 and 1951 to ascertain the position of the fruit buds on one-year-old branches of Bismarck apple trees showed that the percentage of such buds was greatest at the ends of the branches, diminished progressively with increasing distance from the ends and was least at the bases, where almost all the buds were woodbuds.

174. RODRIGUES, A., AND MENEZES, A.

Sobre as relações entre o número de sementes, a forma e as dimensões dos frutos, da pereira Rocha. (The relationship between the number of seeds and the shape and size of fruits of the pear variety Rocha.) [English summary 1 p.]

Agron. lusit., 1951, 13: 227-51, bibl. 3, illus. [received 1952].

A detailed study of the problem showed that fruits with

1 or 2 perfect seeds were generally oblong, whereas fruits with 5 or 8 seeds were generally spherical. Oblong fruits usually had less than 4 perfect seeds and spherical fruits more than 4. Although fruits with 1-2 seeds were significantly longer than fruits with 4-5 or 7-8 seeds, there was no significant difference in shape between fruits with 4-5 and 7-8 seeds. The higher the number of seeds, the smaller was the fruit. The differences in size and shape are illustrated in a series of drawings.

175. COMELLI, A.

Description des "galeuses" ou "galleuses" de Bretagne. (The galled apples of Brittany.) *Fruits d'Outre Mer*, 1952, 7:213-14.

Several varieties of apple in Brittany have branch galls which are an intrinsic characteristic. A description of the Galeuse d'Hiver (Winter Gall) variety is given.

176. MOLOTKOVSKIĬ, G. H.

Altering the properties of the bird cherry and of plum by disturbing the polarity of the axial organs. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 81: 105-8, bibl. 5, illus.

The experiments described were carried out with 15 one-year-old plants each of bird cherry [*Prunus padus*] and plum. In each group 5 plants were left untreated, 5 were placed in an inverted position, and in 5 the terminal portion (about 10-15 cm. long) was bent downwards. The stems of 2 of the control and 2 of the inverted plants were ringed at a few cm. from ground level. The disturbance in polarity affected the biological activity of the treated plants. Thus the polarity (geotropism) of certain cells of the roots was inverted. These cells, as a result of an alteration in the flow of nutrients formed tissues dissimilar to those from which they originated; some of the tissues produced tubercles from which shoots arose.

177. CROSBY, E. A., AND CRANE, J. C.

The relationship of the carbohydrate cycle to the expression of parthenocarp in Mission and Adriatic figs.

Proc. Amer. Soc. hort. Sci., 1952, 59: 196-206, bibl. 15.

In California the Mission fig produces 2 crops a year while the Adriatic fig drops nearly all the first or breba crop and matures only the late summer one. Vegetative and fruit growth was compared in the two varieties. Removal of the terminal vegetative buds of the shoots of Adriatic effectively increased fruit set in the breba crop even if postponed until fruit drop had started. In both varieties 4 maxima and 4 minima occurred annually in the carbohydrate content of 1-year-old twigs, and it was shown that no relationship existed between the drop of breba fruit in Adriatic and limited carbohydrate supply.

Pollination and fertility.

178. OBERLE, G. D., AND GOERTZEN, K. L.

A method for evaluating pollen production of fruit varieties.

Proc. Amer. Soc. hort. Sci., 1952, 59: 263-5, bibl. 4.

A method of determining the number of pollen grains

per anther with the aid of a haemocytometer is described. Counts made in 1949 and 1950 on several varieties each of apple, peach, plum and grape showed marked variations in the number of pollen grains per anther produced by the different species and by different varieties of the same species. There was also considerable variation as between the 2 years for the same variety of fruit.

179. BARRETT, H. C., AND ARISUMI, T.

Methods of pollen collection, emasculation, and pollination in fruit breeding.

Proc. Amer. Soc. hort. Sci., 1952, 59: 259-62, illus.

Descriptions are given of a rapid system of collecting large quantities of pollen, an emasculator developed for grapes and adapted for pears and apples, and a pollen atomizer to replace brush applications.—Univ. Illinois.

180. VIEITEZ, E.

El uso del cloruro 2,3,5-trifeniltetrazolium para determinar la vitalidad del polen. (The use of 2,3,5-triphenyltetrazolium chloride for determining the viability of pollen.) [English summary $\frac{2}{3}$ p.]

An. Edaf. Fis. veg. Madrid, 1952, 11: 297-308, bibl. 11, illus.

Experiments with maize pollen at the Misión Biológica de Galicia, Pontevedra, have shown that the tetrazolium salt test can be used as a quick, reliable method of determining the viability of pollen. It is recommended that the test be made at 50° C. using a 2% solution.

181. TATARINCEV, A. S.

Pollination within the confines of the clone in apple. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 78: 779-82, bibl. 8.

From data recorded for the variety Antonovka it is concluded that (1) pollination with pollen from other trees of a clone is more efficient than with pollen from the same tree, (2) the germination and development of the pollen grains on the pistil of the same flower is negligible, whereas it is more pronounced with pollen from other flowers of that tree, with a mixture of pollen from other trees of the same clone, and particularly with that from other varieties, (3) the growth of the pollen tubes within the style of a flower is more rapid with a mixture of pollen from other trees of the same clone than with pollen from the same tree.

182. USHIROZAWA, K., AND SHIBUKAWA, J.

Studies on the storage of apple pollen.

[Japanese, English summary 3 pp.]

[*Mim. Publ.*] *Aomori Apple Exp. Stat.*, 1952, pp. 4, bibl. 2.

Experiments with a number of apple varieties and 1 pear variety showed that pollen stored in glass tubes in a desiccator retains some viability for 6-9 years. [There are discrepancies in the English translation which make the duration of storage uncertain.]

183. ROBERTS, D.

Honey bees and pollination of orchard fruits.

N.Z. J. Agric., 1952, 84: 465-6, illus.

The requirements necessary for maximum pollination by honey bees are outlined. It is shown that some

varieties of plum, apricot, peach and pear may be affected detrimentally by the presence of competing plants, which, having a higher sugar concentration of nectar, are more attractive to bees.

184. GLYNNE JONES, G. D.

The responses of the honey-bee to repellent chemicals.

J. exp. Biol., 1952, 29: 372-86, bibl. 6, illus.

This paper is concerned with the development of techniques for the study of the chemotropic responses of the honey-bee and their application to the study of the effect of adding a repellent to a solution of an attractant. It would appear that for a repellent to be capable of effectively reducing the number of visits to a source of food, it must be capable of irritating the common chemical senses of the bee.—Seale-Hayne agric. Coll., Devon.

185. LU, C. S., AND ROBERTS, R. H.

Effect of temperature upon the setting of Delicious apples.

Proc. Amer. Soc. hort. Sci., 1952, 59: 177-83, bibl. 12.

In greenhouse studies dwarf Delicious apple trees set fruit well at 55° F. and badly at 70° F. McIntosh and Wealthy were less affected by high temperatures. In the open it would appear that Delicious sets fruit best under conditions of cool nights and with days just warm enough to encourage bee activity.

186. BAJPAI, P. N.

Sterility in loquat.

Sci. and Cult., 1952, 18: 88-9, bibl. 3.

Panicles of two loquat varieties growing at Kanpur contained 18-200 flowers. Terminal flowers opened first and showed a higher percentage fruit set than laterals. Removal of terminal buds led to an increased set of lateral flowers. Non-setting of most flowers in September and October was due to lack of viable pollen in those months. Cross-pollination of the two varieties gave 18.5% and 20.6% set respectively compared with 1.4% set from self-pollination in both cases.

187. SPINA, P.

Prove preliminari con sostanze ormoniche sul fico (*Ficus carica* L.) per ottenere frutti partenocarpici. (Preliminary tests with hormones on the fig tree to induce parthenocarp.) [English summary ½ p.]

Ann. Sper. agrar., 1952, 6: 923-32, bibl. 12.

In experiments at Acireale Experimental Station in 1950 and 1951 with 7 hormone substances, some proved efficacious but further study of their practical application is required. The best results were obtained with indolebutyric acid (bagged branches—24%, 32% and 18% fruit set at 200, 400 and 600 p.p.m. respectively; unbagged—41% and 32% at 400 and 600 p.p.m.), 2,4-D (bagged—27%, 29% and 43% fruit set at 100, 200 and 300 p.p.m. respectively), and 2,4,5-T (unbagged—49% and 27% at 10 and 25 p.p.m.); on the control branches there was only 13% mature fruit.* These 3 substances caused more or less severe chlorosis, defoliation and desiccation in bagged branches but their ill effects were negligible in unbagged branches.

* Amount of fruit set not stated.

Soil management, fertilizers and irrigation.

(See also 87-89, 95, 96, 100, 101, 285e, s, w, 382, 413, 1128, 1129.)

188.* GREENHAM, D. W. P.

Orchard soil management.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 12, bibl. 24.

The object of orchard soil management is the maintenance of suitable soil conditions for plant growth, in nutrient supply and in physical conditions. The role of organic matter is discussed, and types of soil management are classified according to the soil disturbance involved and the nature of the organic matter supply. After brief mention of clean cultivation with and without organic manures, and of the use of weed killers, recent work at East Malling on straw mulches for soft fruit is discussed. Increased frost damage at blossom time was encountered with black currants, but the otherwise beneficial effects on growth and cropping are attributed to conservation of moisture. It is considered that the mulch acts as a non-return valve, and that only relatively non-absorbent materials would be effective. Results of experiments on annual and permanent cover crops are given, and it is concluded that a suitable grass and clover sward, frequently mown with a gang-mower, is in most cases the best form of soil management for English orchards. This system has shown the following advantages: (1) maintenance of soil fertility, (2) regulation of growth and cropping, (3) reduction of mineral deficiencies, (4) improvement in fruit colour, (5) reduction in amount of pre-harvest drop, and (6) easy working conditions. [Author's summary.]

189. ALDERFER, R. B.

Research in orchard soil management.

Proc. 93rd annu. Mtg Pa St. hort. Soc. 1952, 9 (1): 41-3.

A brief discussion on materials, including krillium, which can improve the structural condition of the soil. A note is given on an experiment conducted in a Pennsylvanian apple orchard in 1946-49, in which a pea vine mulch was considerably more effective in improving soil structure than straw mulch, and Ladino clover sod was more effective than Kentucky blue grass sod.

190. MORITA, S., AND AOKI, A.

Studies on the soils of apple orchards in Japan. II. On the soils of the apple orchards in Aomori Prefecture. Physical and chemical properties in general.

J. hort. Ass. Japan, 1952, 20: 205-8, bibl. 3.

Three soil types on which apples are normally grown in Aomori Prefecture, Japan, are described. From the data presented it is concluded that both their chemical and physical properties are satisfactory for apple growing.

191. SHIBUKAWA, J., HOSOGAI, S., AND SOTO-KAWA, T.

Studies on soil erosion control in apple orchards. I. Erosion survey in sloping apple orchards. [Japanese, with English summary ½ p.]

J. hort. Ass. Japan, 1952, 20: 181-6, bibl. 12, illus.

A survey on 199 acres of cultivated apple orchards

* See note, p. 3.

planted from 1909 onwards, 80% of which were on slopes of 8 to 25 degrees, showed that 32% of the total area was subject to moderate or moderately severe sheet erosion and 38.4% to severe erosion.

192. SHIBUKAWA, J., SOMA, M., AND SOTO-KAWA, T.

Studies on soil erosion control in apple orchards. II. Run off soil caused by melting snow. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1952, 20: 187-90, bibl. 8, illus.

Melting snow from a cultivated apple orchard on a 28 per cent slope resulted in a loss of soil in March 1951 equivalent to 184 kg. dry matter per acre.

193. REYNTENS, —.

Recherches sur la couverture du sol dans les vergers H.T. (Research on the herbage in [grassed] orchards.)

Fruit belge, 1952, 20: 118-20.

Notes on botanical composition of orchard swards, the effect of chemical fertilizers, mulching and the preference of geese and livestock for particular species.

194. HO[UTER, P. J.]

Maaien in de boomgaard. (Orchard mowing.)

Jaarversl. Inst. TuinbTech. Wageningen, 1951, pp. 33-4.

The grass sward of a cherry orchard was mown throughout on May 17. Thereafter different plots were mown when the grass reached a height of 5, 10, 15, 20, 25, 30 or 35 cm. By December the highest proportion of good grasses was found in the plots mown whenever the grass reached a height of 5-10 cm. *Agrostis* increased and Perennial rye grass decreased with frequent mowing.

195. SHIBUKAWA, J., AND FUKUSHIMA, S.

Studies on apple sod culture. I. The growth of red clover in a closely planted apple orchard. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1952, 20: 175-80, bibl. 12, illus.

The growth of red clover plants was compared in a crowded apple orchard and in the open. Light intensity was similar in both areas when the trees were in the mouse ear stage, but by June the intensity under the trees was only 50% of that in the open and was continuing to decline. Although shaded clover plants growing in pots grew taller than exposed plants, their green top weight in 1949 was only 25%, and in 1950 80% and 20% in two cuts, of that of the exposed plants. With clover that had been planted out, the growth of shaded plants was 20% and 50% of that of exposed plants in the two years.

196. SHIBUKAWA, J.

Soil management and fertilization for apple orchards. [Japanese, English summary 4 pp.] [Publ.] *Aomori Apple Exp. Stat.*, 1952, pp. 46, illus.

The soil management method advocated is the establishment of a cover crop of legumes or grass or a mixture of both in contour strips 2-12 ft. wide to provide a mulch for the trees. The recommended annual fertilizer programme is: N—330 lb. 20% ammonium sulphate per acre, 60% being applied in April-May and the balance

in June; P—200 lb. 16% superphosphate; K—100-165 lb. muriate or sulphate of potash in April-May.

197. KENWORTHY, A. L., AND GILLIGAN, G. M.
Tree growth, soil and leaf analysis in response to various soil management practices in a young apple orchard.

Circ. Del. agric. Exp. Stat. 24, 1949, pp. 11 [received 1952].

Replicated trials were conducted between 1943 and 1947 in an orchard planted on sandy soil near Georgetown with Golden Delicious, Richared and Red Stayman at 35×50 ft. and fertilized each spring with 0-12-12 at 300 lb./acre. Sodium nitrate at $\frac{1}{2}$ lb. per tree per year of age was also applied except in treatments (4) and (5). Five types of treatment were practised: (1) permanent pasture grass, (2) cover crops, (3) straw mulch at base of trees and cover crop, (4) cover crop (soya-beans) with poultry manure of the same N content substituted for the N fertilizer, (5) cover crop (soyabeans) with complete fertilizer of the same analysis substituted for poultry manure. The results are set out in detail and discussed. The conclusion is reached that a suitable programme consists of a combination of grass, mulch and poultry manure with the mulch applied to the trees and the manure to the grass.

198. FLEMING, H. K.

Soil management tests in a Montmorency sour cherry orchard.

Proc. 93rd annu. Mtg Pa St. hort. Soc. 1952, 9(1): 55-6.

The effects of 6 different fertilizer treatments are very briefly evaluated. None of the dressings influenced tree size either on the cultivated or on the sod portion of the orchard. The highest yield of cherries for a 5-year period was obtained on plots, both cultivated and under sod, receiving 1,000 lb. per acre of 10-6-4 fertilizer.

199. MORITA, Y., AND YONEYAMA, K.

Studies on physical properties of soils in relation to fruit tree growth. II. Soil atmosphere and tree growth. (3) Growth of pear, persimmon and apple seedlings as influenced by various concentrations of oxygen in the soil atmosphere. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1951, 20: 73-6, bibl. 4, illus.

There was no difference in the top growth of apple, pear and persimmon seedlings grown in soil with about 7% O₂ compared with seedlings grown in control plots containing 15-20% soil O₂. Leaves became somewhat yellowish when O₂ was maintained at 5%. At concentrations between 1% and 5% root development was checked but did not cease altogether, which is in contrast to results obtained with peaches in which fibrous roots died at these low O₂ levels [see next abstract].

200. MORITA, Y., AND NISHIDA, T.

Studies on physical properties of soils in relation to fruit tree growth. II. Soil atmosphere and tree growth. (4) Growth of peach and persimmon (*D. lotus* Linn.) seedlings as influenced by various concentrations of oxygen in the soil atmosphere. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1952, 20: 137-43, bibl. 3, illus.

Peach and persimmon seedlings were grown in pots with regulated soil oxygen (O_2) supplies. Top growth of peaches was normal at an O_2 content of about 7% or more, was much reduced at under 5%, while at 2% shoot growth ceased and the plants wilted after 6 days, defoliated after 10 days and started dying after 20 days. Root growth of peaches ceased below 5% O_2 and was not normal until the O_2 content reached 10% or more. Persimmons tolerated lower O_2 contents; at 3% leaf colour did not change nor did death occur until later in the growing season, and root growth was practically normal at 5% or more. [See also preceding abstract.]

201. MORITA, Y., AND NISHIDA, T.

Studies on physical properties of soils in relation to fruit tree growth. II. Soil atmosphere and tree growth. (5) Growth of peach, apple, pear and persimmon (*D. lotus* Linn.) seedlings as influenced by various concentrations of oxygen in the soil atmosphere. [Japanese, with English summary $\frac{1}{2}$ p.] *J. hort. Ass. Japan*, 1952, 20: 144-52, bibl. 5, illus.

Apple, pear, peach and persimmon seedlings were grown in pots with soil oxygen (O_2) supplies regulated to provide concentrations of 0, 1, 2, 5, 10 and 20%. Results with peach and persimmon were similar to those recorded earlier [see abstract above]. In 5% or more O_2 there was little difference between treatments for any of the species. In less than 1% O_2 apple and pear seedlings wilted after 1 week and died after about 2 weeks.

202. MORITA, Y., AND OGURO, E.

Studies on physical properties of soils in relation to fruit tree growth. III. Soil moisture and tree growth. (3) The influence of mulching upon the soil moisture and root distribution of peach seedlings. [Japanese, with English summary $\frac{1}{2}$ p.] *J. hort. Ass. Japan*, 1951, 20: 11-18, bibl. 9, illus.

Peach seedlings planted in sandy loam soil were mulched with 3 kg. straw on July 4, control plants being clean cultivated. One month later the mulched trees showed superior top growth to the cultivated, and by September the difference was still more marked. The mulched trees showed greater root development in the surface 0-10 cm. of soil, most of the fine roots less than 1 mm. thick being concentrated in this zone, whereas with the cultivated trees most of the fine roots were found at a depth of 10-20 cm. There was little difference in distribution between 20 and 60 cm., but below 60 cm. the mulched trees had more roots, on a fresh weight basis, than the cultivated trees. The effects of the mulch on soil moisture did not appear to extend below 20 cm.

203. MORITA, Y., AND YONEYAMA, K.

Studies on physical properties of soils in relation to fruit tree growth. III. Soil moisture and tree growth. (4) Effects of soil moisture on the growth of mume and cherry seedlings and fig cuttings. [Japanese, with English summary $\frac{1}{2}$ p.] *J. hort. Ass. Japan*, 1952, 20: 153-7, bibl. 5.

Prunus mume and cherry seedlings made normal growth when soil moisture was maintained at levels between

20 and 40% of dry weight of soil, but top growth ceased when moisture was kept at 10%. Fig cuttings grew normally at 30-40% and stopped growing at 15% moisture. Waterlogging soon checked growth and leaves became yellow and roots black. In these and other species tested the top/root ratio declined as the soil moisture decreased. As a result of experiments over the past 3 years species may be classified according to their growth response to low or high soil moisture, as follows: (1) With low soil moisture (25-45% of field capacity), *growth good*—grape, chestnut, peach, mume, cherry; *intermediate*—Japanese pear, apple, fig; *poor*—persimmon (*D. lotus*). (2) With high soil moisture (80-100% of field capacity), *good*—persimmon, chestnut, fig, peach, mume; *intermediate*—apple, grape, persimmon; *poor*—cherry.

204. MORITA, Y., NISHIDA, T., AND OGURO, E.

Studies on physical properties of soils in relation to fruit tree growth. III. Soil moisture and growth. (5) Relation between soil moisture and oxygen decrease in the soil atmosphere where peach and persimmon (*D. lotus* Linn.) seedlings are growing. [Japanese, with English summary $\frac{3}{4}$ p.] *J. hort. Ass. Japan*, 1952, 20: 158-65, bibl. 6, illus.

In pot experiments peach seedlings made vigorous growth with 30 and 35% soil moisture and persimmons with 25, 30 and 35%. Under these conditions of water supply the soil O_2 concentration dropped below 10% but not to an extent which would limit growth. At 15% soil moisture peaches made considerable growth and at 20% normal growth, whereas persimmon growth was poor below 25%. At 40% soil moisture the O_2 concentration tended to fall below 5% and under these conditions growth, particularly that of peaches, was reduced.

205. PROEBSTING, E. L.

Organic wastes for mulch. *Calif. Agric.*, 1952, 6 (7): 15.

Tests suggest that grape pomace, coffee waste and spent hops are suitable mulching materials for orchards and vineyards, especially where the fire hazard makes the use of straw, sawdust, etc., risky. Materials that have proved toxic to trees are the liquid effluent from brandy stills and vanilla bean residues.

206. GOODMAN, R. N.

Orchard mulches in relation to effectiveness of precipitation. *Proc. Amer. Soc. hort. Sci.*, 1952, 59: 119-24, bibl. 2.

Torrential rains make run-off a problem in many Missouri orchards. From 1942 5-year-old Jonathan apple trees were subjected to sod or sod plus hay or straw mulch at 200 lb. per tree. In 1950-51 soil moisture was recorded weekly at depths of 2 to 24 in. The results indicate that mulching leads to more efficient use of rainfall, because (1) after drought periods moisture is restored to field capacity sooner under mulch than under sod, and (2) during the growing season the moisture contents of soils under mulch are considerably higher than those under sod. It is concluded that an increased infiltration capacity induced by mulching is partly responsible for these more favourable conditions.

207. BOYNTON, D., SMOCK, R. M., AND ANDERSON, L. C.

Short term effects of non-leguminous hay mulch and nitrogen fertilizer separately and in varying combinations on the behavior of McIntosh apple trees. A progress report. *Proc. Amer. Soc. hort. Sci.*, 1952, 59: 103-10, bibl. 7.

Three levels of over-mature hay mulch, 0, 100 and 200 lb. per tree, and 3 levels of N, 0.33, 0.66 and 1.00 lb., were applied in 1949 in a 3² factorial experiment to 12-year-old McIntosh apple trees growing in a non-leguminous sod orchard in New York State. The mulch was applied on 1 July, the N as ammonium nitrate in April. In 1950 the levels of application were reduced to 0, 50 and 100 lb. mulch and 0.33 and 0.66 lb. N per tree. Results for 1950, the first full crop year, are given in detail. The main effects of mulch have been indistinguishable from those of N fertilizer in terms of leaf N, leaf chlorophyll, shoot growth, total crop, preharvest drop, fruit surface and ground colour, fruit firmness and post storage brown core. Even the effect of K from the mulch appeared to be modified by its N effect. Fruit size was significantly increased by mulching but as the rainfall was plentiful this, too, would appear to have been an effect of N rather than of soil moisture. On the other hand data for soil ammonia and nitrate did not show marked or consistent increases associated with mulching. The N effects of mulch may have been due to increased rates of ammonification or nitrification and/or enhanced availability of N, but further work will be needed to determine this.—Cornell Univ.

- 208.* HILL, H.

Foliage analysis as a means of determining orchard fertilizer requirements.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 16, bibl. 11.

The relation between foliage analysis and the quality of McIntosh and Spy apples was studied [in Canada] with material derived from two sources: (a) trees in a uniform orchard block receiving differential fertilizer treatments, and (b) from grower orchards in which management and fertilizer treatments varied from orchard to orchard. A study was also conducted on the relation of leaf nitrogen to the occurrence of bitter-pit in the Lawfam variety. In the first phase of the study in both the Spy and McIntosh varieties a highly significant negative correlation was obtained between the foliage nitrogen and fruit quality in three successive years. In the Spy variety a marked decrease in quality occurred with foliage nitrogen above 1.9 to 2.0% and a like decrease of quality occurred in the McIntosh variety with foliage nitrogen above 2.0 to 2.1%. Variations in weather from year to year influenced the degree to which nitrogen supply was reflected in the foliage nitrogen. Under the conditions existing in this orchard the application of more than five pounds of ammonium sulphate per Spy tree and an amount intermediate between five and ten pounds per McIntosh tree reduced fruit quality appreciably. Increasing concentrations of foliage nitrogen were accompanied by decreased concentrations of phosphorus and potassium and increased concentrations of magnesium. Yield data for the McIntosh variety indicated that some yield increase might be expected with

foliage nitrogen above 2%. In the second phase of the study, conducted in grower orchards, a highly significant negative correlation existed between foliage nitrogen and quality of the McIntosh fruit in both years. As in the first part of the study fruit quality was reduced if foliage nitrogen was greater than 2%. There appeared to be a much smaller positive relation between foliage potassium and fruit quality and it is suggested that quality may be impaired if potassium levels fall below 1.7%. No relationship was established between foliage phosphorus and fruit quality. In the commercial orchards sampled, 50% had a higher foliage nitrogen content than desirable. A highly significant positive relation was obtained between foliage nitrogen and the occurrence of bitter-pit in the variety Lawfam. A sharp increase in bitter-pit occurred with foliage nitrogen above 2.3%. [Author's summary.]

209. SUGIYAMA, T., AND OTHERS.

On the leaf analysis of apples in Nagano Prefecture. [Japanese, with English summary 1/3 p.]

J. hort. Ass. Japan, 1952, 20: 191-8, bibl. 20.

Minimum, maximum and mean N, P and K contents of leaves are tabulated for samples collected from Jonathan and Rall's Janet apple trees in late July and early August, 1950. Comparison of comparable samples showed the N, P and K contents of Rall's Janet to be significantly higher than those of Jonathan. N and P were positively correlated in the leaves of both varieties. Older trees of Jonathan contained slightly less N and P, and older trees of Rall's Janet slightly less P, than young trees. No correlation was found between leaf nutrients and amounts of the same elements applied as fertilizers. There were no differences in leaf composition between apples grafted on Mitsuha-kaido (*Malus sieboldii*) stock and trees grafted on Maruba-kaido (*M. prunifolia*) stock. Differences in leaf composition of trees in different districts are indicated.

210. GACHON, L.

Application du diagnostic foliaire au pommier: comparaison de l'alimentation N.P.K. d'arbres adultes et d'arbres agés. (The application of foliar diagnosis to apple trees.) *C.R. Acad. Agric. Fr.*, 1952, 39: 477-9.

Observations made in 1950 and 1951 on Reinette blanche du Canada apple trees indicate that the mineral status of apple leaves shows distinct differences according to their position and the date of sampling. Data for two series of trees—adult (20 to 25 years old), and old (60 years old)—are tabulated, samples being taken in May and at the time of fruit ripening.

211. TUKEY, H. B., AND OTHERS.

Absorption of nutrients by stems and branches of woody plants.

Science, 1952, 116: 167-8, bibl. 10, being *J. Art. Mich. agric. Exp. Stat.* 1372.

When K⁴² as potassium carbonate was applied in 6 in. bands to the branches of bearing apple trees during freezing weather in mid-winter, K was detected 24 hrs. later in both xylem and phloem 18 in. above and below the point of application. Similarly P³² as o-phosphoric acid applied in 2 in. bands 6 in. above the soil to the stems of dormant 2-year-old apple and peach trees was detected 28 hrs. later both in the stem above the point of application and in the roots. Measurements of urea

* See note, p. 3.

hydrolysis were also made following applications of C^{14} urea to apple, peach and cherry trees in full leaf. Most rapid hydrolysis occurred when urea was applied to the bark of branches in full leaf, somewhat slower hydrolysis when urea was applied to a comparable leaf surface and still slower hydrolysis when the application was made to the bark of branches from which the leaves had been removed. Applications to the bark of dormant trees of several nutrients at different concentrations showed injury from concentrations greater than 8% of calcium chloride, *o*-phosphoric acid and urea, but not from potassium nitrate at up to 32%. When young apple and cherry trees had just started growth, however, no injury followed the application of urea at 32%. The quantities of nutrients that were retained following bark applications were found to be considerable. It is concluded from these data that the woody portions of the plant must be taken into account in work on so-called "foliage feeding".

212.* TUKEY, H. B.

The uptake of nutrients by leaves and bark of fruit trees.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 9, bibl. 29.

Studies with radioactive isotopes have shown that such materials as ortho-phosphoric acid, potassium carbonate, and urea may move readily into the above-ground parts of plants not only through the leaves but through the bark as well, even in mid-winter. Phosphorus and nitrogen tend to move towards regions of greatest metabolic activity in the plant, whereas potassium is more generally distributed. The surface area of a dormant 25-year-old apple tree was determined as 86.00 square metres. Such a tree was capable of retaining 1,364 grammes of urea as a 32% spray. Apple leaves retained more nutrient material than pear, sour cherry, peach, and sweet cherry leaves in the ratio of 23, 17, 6.9, 5.6 and 5.6 respectively. Urea was hydrolyzed at different rates by different plants. For leaves of the apple, cherry and peach the ratio was 42, 15 and 15 respectively. For comparison, the ratio for cucumber was 425, red raspberry 277, bean 160, tomato 83, corn 65, celery 20, and potato 20. Tolerance of high concentrations of urea was in inverse relationship to the rate of hydrolysis. Urea was hydrolyzed by the bark of apple, cherry and peach in the ratio of 30, 10 and 8 respectively. If leaves were present, hydrolysis was markedly increased in the apple to 130, and to 32 and 20 for the cherry and peach respectively. Foliar and bark applications of nutrients may be used to correct mineral deficiencies, to provide specific nutrients at critical periods, to adjust nutrient levels to climate variations, and to aid in recovery from winter injury. Fungicides and insecticides need to be evaluated in terms of nutrition. In any appraisal of "foliar feeding", other portions of the plant must be considered as well, such as trunk, branches, and shoots. [Author's summary.]

213.* LECRENIER, A., and DERMINE, E.

La fertilisation du pommier. 5 années de recherches sur la répartition des éléments chimiques dans la plante. Leur influence sur le rendement. (Apple manuring: Belgian work.)

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 8.

* See note, p. 3.

Five years' experiments on fruit tree manuring at Gembloux lead to the following conclusions. The yield of full grown trees planted in good soils and receiving normal amounts of fertilizers cannot be modified rapidly merely by increasing those amounts. Fertilizers applied below the soil surface by means of an injector were not more efficient and had no more rapid effect on the trees than surface dressing did. It is suggested that: (a) the solutions were too highly concentrated and on that account toxic to the roots; (b) the solutions injected in the soil did not spread adequately. This problem was approached by way of tracer technique, phosphorus P^{32} being used for the purpose. Quantitative analysis of the plant tissues were made for 7 elements: N, P, S, Cl, K, Mg, Fe. Studies were made of dynamic and static chemicals in the plant. Sampling methods of plant tissues were also studied. The analysis of plant tissues is very important for interpreting plant nutrition. It supplies valuable information for studying the movements of the elements, their deficiencies and excess. [Authors' summary.]

214. RANDHAWA, G. S.

Fruit quality as affected by nutritional status of Kieffer pear trees.

Indian J. hort., 1952, 9 (2): 14-17, bibl. 8.

Post-graduate studies in Michigan and Ontario in 1948 indicated that Kieffer pear trees of which the leaves have low Ca and N contents bear fruits with low contents of total solids and ascorbic acid.

215. SERGEENKO, V. M.

Methods of overcoming biennial bearing in apples. [Russian.]

Sad i Ogorod, 1952, No. 8, pp. 16-21.

Fertilizer recommendations, based on trials conducted at the Crimean Tree and Soft Fruit Experimental Station, are made for the control of biennial bearing of apples. They consist of heavy organic fertilizer treatment every 2-3 years, yearly applications of 90 kg. P and 60 kg. K per ha, either in the spring or in the autumn, and 4 N. treatments containing 40-60 kg. actual N per ha. to be applied (a) 2-3 weeks before blossoming, (b) after full bloom, (c) after the June drop, and (d) in July. Regular pruning forms an important part in the care of biennial bearers and a warning is given against neglecting any of the normal cultural practices.

216. BLACK, J. D. F.

Fertilizer trials on apples in southern Victoria.

J. Dep. Agric. Vict., 1952, 50: 313-18, illus.

In fertilizer demonstration plots on apple orchards in southern Victoria, complete manure (2 : 2 : 1) at the rate of 5 lb. per tree per annum, applied in spring (August) just prior to cultivation has maintained a high level of production over a period of 15 years in trees which are now more than 30 years old. Over the same period, "nil" treatment resulted in a decline in production typical of ageing trees, while sulphate of ammonia, at 4 lb. a year applied in spring, resulted in a similar but slightly greater decline in yield. In addition to the spring fertilizers, a leguminous cover crop, such as lupins, tick beans or subterranean clover, was planted in alternate rows each autumn, and sown with superphosphate at 2 cwt. per acre; as this was done to the whole block it was considered not to affect the comparison of yields from the plots.

217. DULLUM, N., AND RASMUSSEN, P.

Forsøg med forskellig udbbringningstid for chilesalpeter til æbletræer 1932-50. (**Trials on the timing of sodium nitrate applications to apple trees 1932-50.**)

Erhvervsfrugtavl., 1952, **18**: 178-83, being *Beret. Stat. Forsøgsvirks. Plantekult.* **455**.

The trials were carried out on a fertile loam soil with over one hundred apple trees on their own roots belonging to 6 varieties. Three treatments were compared: (a) No nitrogen; (b) 500 kg. sodium nitrate per hectare applied annually on 15 March; and (c) 500 kg. sodium nitrate applied annually on 15 July. P and K were uniformly supplied on all three plots. The yield response to (b) was found to be marked and to (c) slight, the actual yield in kgs. per tree per year during the period 1933-50 being, for instance, for Bramley's Seedling and Cox's Orange: (a) 162, (b) 206, (c) 178 and (a) 31, (b) 49, (c) 35 respectively. Among other effects of N noted is the deterioration in fruit colour resulting especially from spring applications, a small increase in growth rate and the distinctly darker green of the foliage. Full data are tabulated.—Blangstedgaard.

218. HARRIS, R. W., AND BOYNTON, D.

Nitrogen fertilization and cultural practices in relation to growth and fruitfulness of an Elberta peach orchard in New York.

Proc. Amer. Soc. hort. Sci. 1952, **59**: 36-52, bibl. 20.

This paper reports the growth and fruiting responses of mature Elberta peach trees in western New York under four fertilizer and soil management treatments. The treatments consisted of two levels of nitrogen fertilization superimposed upon cultural practices of moderate cultivation and of an early seeded summer non-legume cover crop. The treatments had marked effects on soil nitrates and ammonia, leaf nitrogen and chlorophyll, tree growth, fruit yield, size, quality and time of maturity. From the commercial standpoint, considering both production and quality, the most satisfactory treatments were those causing the trees to be intermediate in vigour. This was accomplished either by early cessation of cultivation with summer cover crop and heavy fertilization, or by later cultivation and light fertilization. [Authors' summary.]

219. SHEAR, G. M., AND HORSFALL, F., JR.

Leaf nitrogen and color responses to nitrogen fertilization.

Proc. Amer. Soc. hort. Sci. 1952, **59**: 65-8, bibl. 3.

During 4 years sodium nitrate was applied in early spring, at various rates ranging from 2.5 to 26.5 lb. per tree, to York and Stayman apple trees that were 34 years old at the outset and in a relatively low state of vigour. Yields were too variable to provide conclusive evidence on the effect of level of N fertilization on yield, and similarly fruit colour and size were affected significantly by N in only 2 years in the case of Stayman and 1 year in the case of York. High correlations, ranging from 0.93 to 0.97, were found between N applied and leaf N, both actual and estimated from colour, but the use of this finding in practice is precluded, because (1) it was not sufficiently sensitive to nitrate increments of less than 6 lb. per tree and (2) estimated N based on leaf colour fluctuated sharply from year to year, so that

in one year trees receiving 2.5 lb. nitrate had higher estimated N contents than trees which in the next year received 14.5 lb. nitrate.—Va agric. Exp. Stat., Blacksburg.

220. RODNEY, D. R.

The entrance of nitrogen compounds through the epidermis of apple leaves.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 99-102, bibl. 3.

One-year-old Richared apple trees, grown in culture solution containing no N, absorbed N through the leaves when sprayed with water solutions of urea, calcium nitrate and ammonium sulphate. Absorption occurred when urea was applied separately to both upper and lower leaf surfaces, indicating that N compounds entered directly through the leaf cuticle since there are no stomata in the upper leaf surface.—Ohio St. Univ., Columbus.

221. COOK, J. A., AND BOYNTON, D.

Some factors affecting the absorption of urea by McIntosh apple leaves.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 82-90, bibl. 4.

In studies at Cornell University on factors affecting the absorption of urea by McIntosh apple leaves results were expressed as the percentages of applied urea that were absorbed. Lower leaf surfaces absorbed urea faster than did upper ones, and the lower surfaces of young leaves showed a greater uptake than those of older leaves on the same trees. High absorption appeared to be associated with a high original leaf N level, low temperature and low vapour pressure. Absorption was more than doubled by the inclusion of a wetting agent in the spray. The pH of the spray solution had a marked effect under some conditions when absorption at pH 7.2 was much lower than at pH 5.6 or pH 8.0, but under other conditions differences between pH 7.2 and pH 8.0 were slight. Previous light treatment to modify internal carbohydrate levels did not affect absorption of urea. Sucrose added to the spray solution reduced urea uptake and thus decreased injury from strong solutions. Absorption of urea was most rapid during the first few hours but continued at a measurable rate for at least 48 hrs. Of the urea absorbed, 84% was still present in the leaves in soluble form after 8 hrs, 65% after 24 hrs, and 43% after 48 hrs. As the non-soluble N fraction in the leaves did not increase enough to account for much of the absorbed urea that disappeared, it would appear that some of the urea N was translocated from the leaves during the longer absorption periods.

222. FISHER, E. G.

The principles underlying foliage applications of urea for nitrogen fertilization of the McIntosh apple.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 91-8, bibl. 2.

From data accumulated over 4 years at Cornell University the following principles have been established: (1) In orchards requiring N, yield responses to urea foliage sprays are at least as good as those from soil applications of comparable amounts of N. (2) Within the limits of the period from the pre-blossom to the second cover spray, the later urea is applied the greater is the N effect. (3) Leaf sprays of urea cause quicker,

and as great or greater, but less lasting N effects than comparable soil applications of urea.

223. MULDER, D.

Nutritional studies on fruit trees. II. The relation between potassium, magnesium and phosphorus in apple leaves.*

Plant and Soil, 1952, 4: 107-17, bibl. 8.

1. Nutrient relations in apple leaves have been studied [in Dutch experiments] using Morgan's colorimetric method and a method for total analysis. 2. The results obtained by both methods are in agreement with each other. 3. Studies were made on the seasonal variation in the phosphate content of apple leaves. 4. In apple leaves of various varieties, a low potassium content is associated with high phosphorus and high magnesium contents. 5. This relationship has been demonstrated in comparison between samples from a potassium deficient river clay and a magnesium deficient marine loam soil. 6. The fact that high values for leaf phosphorus were obtained from soils with low phosphate contents and *vice versa* suggests that the phosphate content of the leaves is determined by factors other than the soil content. 7. From the parallelism between the phosphate and magnesium contents of leaves, it is concluded that magnesium plays an important role in the uptake of phosphate. 8. In order to increase the phosphate content of the leaves in magnesium deficient areas, it is probably more economical to apply magnesium rather than phosphate fertilizers. 9. Since, according to Brown, apples with bitter pit have a low phosphate content, the importance of the above relations in the case of the bitter pit problem is emphasized. [Author's summary.]—Wageningen.

224. DALBRO, S.

Forsøg med klorholdig og klorfri kaliumgødning til æbletræer. (The manuring of apple trees with potassium chloride and potassium sulphate.) [English summary ¾ p.]

Tidsskr. Planteavl, 1952, 55: 578-90, bibl. 8, being *Beret. Stat. Forsøgsvirks. Plantekult.* 458.

Manurial trials were carried out from 1932 to 1950 on a clay soil at the Blangstedgaard Research Station with the apple varieties Cox's Orange Pippin and Cox's Pomona on M. V rootstock and Transparente blanche on its own roots. Superphosphate (18% P_2O_5) and calcium nitrate (16% N) were supplied annually at the rates 300 kg. and 300-500 kg. respectively and there were three treatments for potassium: (1) 150 kg. potassium chloride, (2) 150 kg. potassium sulphate and (3) no potassium. While the crop of the no-K trees was only about half that of the others, there was no difference between (1) and (2) as regards yield, condition of tree or leaf character. The tables and diagrams presented include data on the effect of the 3 treatments on the potassium content of the soil.

225.† MAGNESS, J. R.

Soil moisture in relation to fruit tree functioning.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7, bibl. 10.

Extensive experiments on the responses of apple, pear

* For Part I, see *H.A.*, 20: 1425.

† See note, p. 3.

and lemon trees to variable moisture conditions conducted by workers in the United States Department of Agriculture are reviewed. Extraction of moisture from soil is roughly proportional to density of feeder root population, so long as all soil contains moisture above the wilting percentage. Feeder root density is often highly variable, so soil moisture is not absorbed from soil uniformly in all parts of the root zone. As soil in parts of the root zone reaches the wilting percentage, water supply to the tree is reduced. This results in functional changes in the tree. Stomata are open for shorter periods daily in leaves. Sugar content of bark and wood is higher, starch content lower. Fruit growth is reduced in proportion to severity of water shortage. Fruit bud formation is increased, if moisture shortage occurs in the period when initiation of floral parts takes place. For optimum functioning and maximum fruit production, fruit trees should be maintained with most of the root zone having available soil moisture throughout the growing season. Trees have a remarkable ability for recovering from temporary periods of moisture deficits. [Author's summary.]

226. BAIER, W.

Ergebnisse von Bodenfeuchteuntersuchungen in Stuttgart-Hohenheim. (The results of soil moisture investigations at Stuttgart-Hohenheim.)

Ber. dtsh. Wetterdienst. U.S. Zone 37, 1952, pp. 35, bibl. 21.

The paper includes a brief reference to fruit trees (not specified), the maximum water uptake of which occurred in the second half of September from soil layers 60-80 cm. deep. Maximum water consumption so late in the season suggests the possibility that the water is needed in connexion with bud formation.—Landwirtschaftliche Hochschule, Hohenheim.

227.* WILCOX, J. C., AND MASON, J. L.

The determination of an irrigation schedule for deciduous orchards.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 8.

The development of a suitable irrigation schedule involves the determination of the answers to two questions: first, when should an irrigation be started? and second, when should it be stopped? The procedure adopted in British Columbia for determining when to start an irrigation is based on the assumption that no major part of the root zone should be allowed to dry to the permanent wilting point. The top soil was found to dry out first, then the soil at progressively lower depths. The procedure used is to place Bouyoucos gypsum resistance blocks at a depth of nine inches, and to irrigate when their resistance reaches 25,000 ohms. The procedure for determining when to stop an irrigation is based on the finding that consumptive use below a depth of four feet is negligible in mature orchards. The procedure used is to place Bouyoucos nylon resistance blocks at a depth of four feet in mature orchards, or less than this in young orchards and in shallow soils, and to stop the irrigation when a change in resistance indicates that the water has reached these blocks. The use of electrical resistance blocks is suggested in grower orchards as well as in experimental plots. [Authors' summary.]

* See note, p. 3.

228. WILCOX, J. C.
Irrigation of horticultural crops. Practice and problems in British Columbia.
Rev. agric. Inst., Canada, 1952, 7 (4): 20-3, illus.

Full-season irrigation is employed in the growing of stone, pome and small fruits, vegetables and grapes in the semi-arid Okanagan valley. Evidence suggests that irrigation through August and September has at times delayed maturity of fruit trees sufficiently to aggravate early frost damage but that a low soil nitrate content late in the season will ensure satisfactory maturity despite a high moisture content; danger from winter injury is also greater if the soil enters the winter too dry. Irrigation does not increase the severity of fireblight of fruit trees if adequate soil moisture conditions are maintained throughout the growing season, and control of fireblight is maintained by winter and summer pruning. Sprinkler irrigation is recommended for all crops grown, except beans for seed and cantaloupes (for which surface irrigation is more satisfactory), wherever there are irregular contours and sandy soil and where surface irrigation causes erosion.

- 229.* ISRAELEN, O. W.
The irrigation of orchards.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 16.

Recent experimental evidence favours the hypothesis that the growth rate of orchard products is more rapid with moisture percentages of 50% to 75% of the available soil moisture capacity than when the percentage is only 10% to 15% or near the permanent wilting percentage. It may be necessary in some climates to irrigate orchards in the dormant season as well as in the growing season. Methods now in use include irrigation by furrows, contour checks, basins, and sprinklers. For all methods, the water distribution system should be designed on the basis of soil texture, permeability, depths, and land topography, to give maximum efficiency of water application without damage to the crop or soils. The depth of each irrigation should be sufficient to fill the available moisture reservoir, and the number of irrigations sufficient to provide the water required each season by the crop. Measurements of soil properties, depths, tensions, and moisture percentages are required to calculate the depth of water to apply to fill the root-zone available moisture reservoir. Excessive depths of water application should be avoided. [From author's summary.]

- 230.* PIJLS, F. W. G.
Irrigation investigations in Dutch fruitgrowing.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 5, bibl. 8.

Notwithstanding high rainfall, heavy drainage of low areas has caused considerable damage on higher ground in the neighbourhood, and this has led to interest in the problems of irrigation in the Netherlands. These problems mainly concerned the determination of an optimum water table by means of the construction of graphs illustrating the correlation of the depth of the water table to yield. For some crops and some types of soil this regression could be found, in other cases it did not hold. Further investigation showed that the soil profile

* See note, p. 3.

was important, notably the depth and the texture of the moisture-containing top layer. Where these layers satisfy minimum requirements of depth, clay and/or humus content, no influence of the depth of the water table exists. This is illustrated by a few examples. It is on shallow soils in the Netherlands that problems of irrigation of fruit trees and other crops are important. Investigation has started mainly on sub-irrigation and sprinkler-irrigation. [Author's summary.]

- 231.* WEST, E. S.
Furrow irrigation of horticultural crops.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 7.

The author sums up relevant experience by workers at Griffith, N.S.W., as follows: "When a given flow of water is turned into a furrow of given length and given slope in a given soil type, and the water is turned off when it reaches the end of the furrow, the relation between the flow used and the quantity of water applied

can be expressed by $Q = \frac{a w}{w - b}$, where Q = the quantity of water applied, w = the flow, and a and b are constants depending on the soil type, slope and length of furrow. a is called the characteristic application and is the limiting amount applied when large flows are used. b is called the limiting flow and is the flow which just equals the total infiltration, so that the water just reaches the end of the furrow. When flows are used that give the characteristic application (or close to the characteristic application) rather large differences in the flow used have little effect on the quantity of water applied, so that it is easy to apply the characteristic application. Hence its importance in irrigation. A decrease in the slope or an increase in the length of furrow or a broad-based, as opposed to V-shaped, furrow leads to an increase in the characteristic application."

The use of growth substances.

(See also 285v.)

232. KULKARNI, N. B.
Tree-culture. (After Varahmihir, an ancient astrologer of India.)
Poona agric. Coll. Mag., 1952, 43 (1): 19-24, bibl. 2.

It is interesting to record that among nine stanzas written by Varahmihir in the sixth century on the planting and spacing of fruit trees is one recommending a decoction to be sprayed on trees to prevent fruit drop.

- 233.* MURNEEK, A. E.
Hormones and growth regulators when fruit is set.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 8, bibl. 43.

Important physiological roles are performed by indigenous plant hormones in setting and early development of fruit. During pollen tube growth, but particularly after fertilization and subsequent formation of endosperm and the embryo, these hormones are active, not only in initiation and growth of the fruit, but also in control of structural changes of the abscission layer of the pedicel. Metabolic stimulation issuing from the fertilized ovules may extend throughout the plant.

* See note, p. 3.

With fruit inclined to parthenocarpy, synthetic plant growth-regulators can be substituted for, or used to amplify, the effects of pollination and fertilization on fruit set and development. In many cases the rate of growth and maturity of the fruit is noticeably hastened by the application of a growth-regulator. Under certain conditions "hormone" sprays are used successfully to control the size of the crop of pome and stone fruits. An explanation is presented of the possible effective function of naphthaleneacetic acid in thinning of apples and peaches. [Author's summary.]

234.* MARTH, P. C.

Advances in the use of growth-regulating substances on deciduous fruits.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 42.

Reviewing the literature the author notes the success of the following: 2,4,5-trichlorophenoxypropionic acid (2,4,5-TP) for controlling harvest drop in apples, naphthaleneacetic acid for thinning (1) flowers and (2) fruitlets. He also notes the, as yet undetermined, capacity of maleic hydrazide to retard flowering, the possible use of 2,4,5-TP for improving set in Bartlett pears and the inducement of parthenocarpic fruits in the Calimyrna fig by trichlorophenoxyacetic acid (2,4,5-T) or parachlorophenoxyacetic acid.

235.* LUCKWILL, L. C.

The mechanism of fruit drop in pome fruits and its control by synthetic growth substances.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 11.

In order to remain attached to the tree the developing apple is dependent upon a continuous supply of auxin passing down the fruit stalk. This auxin prevents the development of the abscission layer at the base of the stalk. A correlation has been established between the three periods of fruit drop in apples and the variations in auxin production by the seed throughout the season. The endosperm of the developing seed appears to be the chief source of this auxin. The fluctuations in auxin content are closely linked with developmental changes in the endosperm. The auxin of the apple endosperm occurs in both "free" and "bound" forms. Chromatographic analysis has shown that it is not identical with indolyl-acetic acid. When the natural auxin supply from the seeds is low, fruit abscission may be temporarily retarded by the application of naphthalene acetic acid (NAA). NAA applied within two to three weeks of petal-fall not only retards abscission but also causes seed abortion. It is this seed abortion which appears to be the primary cause of the increased drop which follows the use of NAA as a thinning agent. In practice NAA has not proved an ideal thinning agent—chiefly because it retards fruit growth. [Author's summary.]

236. SAMISCH, R. M., AND REICH, S.

The use of plant growth substances to control pre-harvest drop of apples in Israel. [Hebrew with English summary 2 pp.]

Ktavim, 1950, Vol. 1, Hebrew pp. 293-307, bibl. 38, English pp. 73-4.

In trials with growth substances, generally added to lead arsenate sprays at 10 p.p.m., α -naphthaleneacetic acid (NAA) proved superior in preventing pre-harvest fruit

drop in 5 varieties of apple to indolebutyric acid or 2,4-D. Data are reported only for sound fruit, as the response of wormy fruit was variable. Activity of NAA reached a maximum 8-12 days after the inception of a response which was generally almost immediate, and appeared to terminate 14-20 days after inception. Raising the concentration of NAA from 10 to 20 p.p.m. increased the effect and gave results comparable with those of 2 successive applications of 10 p.p.m., but further increases in concentration had no additional effect. The best results were obtained when spraying was postponed until severe dropping had just started, which in most cases was about 2 weeks before picking time. The treatment resulted in improved fruit colour.

237. RODRIGUES, A., AND MENEZES, A.

Sobre a monda dos frutos das maceiras (*Pirus malus* L.). (The thinning of apple fruits.) [English summary $\frac{1}{2}$ p.]

Agron. lusit., 1951, 13: 259-318, bibl. 59, illus. [received 1952].

The problem of manual and chemical apple thinning is reviewed, with reference to the literature, and the results of experiments on different methods of hand thinning used on the varieties Bravo de Esmolfe, Gigante do Douro and Reinette de Vignat are discussed.

238. DAVISON, R. M.

Chemical thinning of apples. Main factors influencing effectiveness of sprays.

Orchard. N.Z., 1952; 25(8): 20-1, 23.

Some data from New Zealand trials on the effect of DNOC and ANA [NAA] sprays on yield and size of Sturmer apples are presented. Growers should test concentrations at particular sites before applying the chemicals on an orchard scale. Suggestions are made for the range of concentrations to be tried in the regions of Hawke's Bay and Nelson.

239. WHITE, D. G., AND RICE, M. L.

Promotion of red color of apples. I. Apparent synergism with preharvest sprays of certain chemicals in paired combinations.

Proc. Amer. Soc. hort. Sci., 1952, 59: 238-42, bibl. 9, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1680.

Six compounds (sodium dimethyldithiocarbamate at 2 levels, sodium thiocyanate, 2,4,5-T, 2,4-D and maleic hydrazide) were sprayed individually and in paired combinations on Delicious apples about a month before harvest. From this first season's results it appears that increases in red colour and, in some cases, injuries were due to synergistic reactions of certain combinations.

240. WHITE, D. G.

A progress report on the promotion of red color of Delicious apples by combination sprays.

Proc. 93rd annu. Mtg Pa St. hort. Soc. 1952, 9(1): 31-5, bibl. 9.

A rather shorter, more popular account of the work recorded in *Proc. Amer. Soc. hort. Sci.* 1952, 59: 238-42 [see above, abstr. 239].

241. VRIJHOF, B.

Kunstmatig kleuren van appels. (The artificial colouring of apples.)

Fruiteelt, 1952, 42: 546-7.

Experiments are described in which a proprietary preparation, Lironox, containing 2,4,5-trichlorophenoxyacetic acid, was applied to a number of apple varieties to induce colouring. On some, particularly Golden Delicious, good results were obtained by applications of 125-200 p.p.m. two weeks before picking.

242. HOFFMAN, M. B., AND EDGERTON, L. J.

Comparisons of naphthaleneacetic acid, 2,4,5-trichlorophenoxypropionic acid and 2,4,5-trichlorophenoxyacetic acid for controlling the harvest drop of McIntosh apples.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 225-30, bibl. 7.

Earlier results [see *H.A.*, 22: 185] which suggested that 2,4,5-TP is effective in controlling harvest drop of McIntosh apples and has a longer period of effectiveness than NAA were confirmed in 1950 and 1951. Tests with 2,4,5-T at 20 p.p.m. in 1951 suggest that its effect may last even longer than that of 2,4,5-TP.—Cornell Univ.

243. SOUTHWICK, F. W.

New hormone for apple drop.

Res. in Rev. Mass., 1952, **1** (1): 8-9, illus.

In trials carried out at the Massachusetts Agricultural Experiment Station with 2,4,5-trichlorophenoxypropionic acid and naphthaleneacetic acid for the control of preharvest drop in McIntosh apples, it was found that 2,4,5-TCPA will control drop for a longer period and can be applied slightly earlier than NAA. When applied at the same time as, or 4-7 days before NAA, it gave better results, but when applied 3 weeks or more before harvest there was a danger of hastening maturity too much. The effect on colour and maturity was not uniform.

244. HEWETSON, F. N.

Concentrate applications of 2,4,5-TP sprays for delaying the pre-harvest drop of apples.

Proc. 93rd annu. Mtg Pa St. hort. Soc., 1952, **9** (1): 58-60.

In trials at Arendtsville, Pa, 2,4,5-trichlorophenoxypropionic acid applications at 2, 2½ and 3 times normal concentration (20 p.p.m.) gave considerable reduction of pre-harvest drop in Delicious, Rome Beauty and Stayman apples.

245. PRIOL, J.

Hormoni v sadjarstvu. Škropilni poskusi za preprečenje odpadanja plodov pri jabolkih in hruškah. (Hormones in horticulture. Spraying trials for the control of fruit drop in apples and pears.) [English summary 1½ p.]

Reprinted from *Arh. poljopr. Nauk*, Belgrade, 1952, Vol. **5** No. 7, pp. 22, bibl. 17.

In the first part of this paper the causes of premature fruit fall are discussed, and recent foreign literature on its control is reviewed. The second part gives a detailed account of spraying trials for the prevention of pre-harvest fruit drop conducted for the first time in Yugoslavia in 1949 and 1950, by the Maribor Fruit Research Institute, Slovenia. Alpha-naphthaleneacetic acid alone or in combination with 1% cupric oxide was used on 1 pear and 14 apple varieties, the two sprays being about equally effective. A marked difference was noted in the reaction of the varieties to the treatment applied

about 3 weeks before harvest. Very good results were obtained with the early apples Yellow Transparent, Charlamoff, Transparent de Croncels, Prince's apple [? Prince Albert], Bartlett pear, and the late apples Landsberger Reinette, Ontario, Jonathan, Blenheim Orange, Yellow Belleflower, Adersleben Calville and Canada Reinette, and the treatment of these varieties is now recommended for all fruit-growing districts of Slovenia. Gravenstein, Belle de Boskoop and London Pippin did not respond to the applications favourably and are to be further tested. A standard concentration of 0.001% NAA was found satisfactory for most varieties, but on late keepers such as Ontario and Yellow Belleflower, treated later in the season in cooler weather, the use of a double concentration is recommended.

246. CRANE, J. C., AND BROOKS, R. M.

Growth of apricot fruits as influenced by 2,4,5-trichlorophenoxyacetic acid application.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 218-24, bibl. 16, illus.

The ammonium salt of 2,4,5-T applied to individual large apricot branches on two dates in April at concentrations ranging from 25 to 1,000 p.p.m. markedly increased fruit growth rate, advanced maturity by 18 days and increased fruit size by a maximum of 10.5% due to increased thickness of flesh. Concentrations of 100 and 200 p.p.m. applied on 7 May were ineffective. Apart from enlarged and split sutures in varying degrees the quality of treated fruit was similar to that of untreated. The treatments killed the tips of actively growing shoots, and, although this may not be detrimental, further tests are necessary before commercial application can be recommended.—Univ. Calif.

Planting, training and pruning.

247. NORRGREN, U.

Maskinell plantering av fruktträd. (Planting fruit trees by machine.)

Fruktodlaren, 1952, pp. 122-4, illus.

A machine for transplanting fruit trees with a lifting capacity of 400 kg. is described and its performance discussed. With the help of 2 men, seven-year-old Cox's Orange, Ingrid Marie and Ribston apple trees on M. IV were lifted and planted at the rate of 40 an hour, and four-year-old trees on M. IV at the rate of 120 an hour. Seven-year-old McIntosh trees on M. II were too deeply rooted to allow of mechanical lifting. Machine-handling did not cause any damage to the other trees.

248. LASSAGNE, H.

L'utilisation rationnelle des explosifs dans les cultures fruitières. (The use of explosives in orchards.)

Bull. tech. Inf., 1952, No. 68, pp. 260-8, from abstr. in *Jardins Fr.*, 1952, **6**: 194.

The encouraging results are reported of long experience and many trials on the use of explosives for orchard soils.

249. HOG, R. T. A.

Note on the fastooning of apple trees. A possible challenge to dwarfing rootstocks.

Fruit Year Book, 1953, 1952, pp. 72-7, illus.

A description is given of the successful festooning in the East of Scotland of old apple trees of different varieties. The experiment, now in its 5th year, was designed to prolong the useful life of the trees by a few years but has developed into a virtually new technique of growth control (combining the tying down of branches to check growth and stimulate fruit production with "continuous replacement" pruning) permitting the use of the strongest rootstocks for trees of restricted size and carrying with it the supreme advantage of eliminating the need for summer spraying, thanks to the strong flow of sap. The technique for a double horizontally trained espalier is described. All but the top pair of branches are removed in mid-August to mid-October. The spurs of the 2 remaining branches are removed in March. The best of the fresh young growth arising vertically from these branches is permitted to grow erect for 2-3 years (until it is at least 5 ft. long) and then tied down to a knee-high wire in the autumn with the points vertically downwards. Festoons should be not less than 18 in. apart. After 2 years annual replacement of a number of old festoons can begin. Little pruning is called for. It is interesting to speculate whether by this method young trees can be brought into production on strong-growing stocks as quickly as on dwarfing stocks like Malling IX.

250. WALKER, J. H.

The winged pyramid.

Fruit Year Book, 1953, 1952, pp. 69-71, illus.

The method of establishment is described of the Bradbourne six-winged pyramid, a Cox's Orange Pippin on a Crab C rootstock planted in 1946-47.

251. BROOKLYN BOTANIC GARDEN.

Pruning ornamental and fruit bearing shrubs and trees.

Brooklyn bot. Gdn Rec., 1952, 8: 115-74, illus.

This number of the journal is devoted to pruning and consists of short articles by well-known American authorities on such subjects as the mechanics of pruning, the pruning of deciduous shrubs, roses, broad- and narrow-leaved evergreens, shade trees, bramble fruits, currants and gooseberries, the trimming of hedges, such special techniques as the wedge pruning and thin-wood pruning of fruit trees, summer pruning and fan-style pruning, and the production of flower buds by trees and shrubs. Most of the articles are very well illustrated.

252. CHRISTENSEN, H.

Forsøg med beskaering af aebletraeer. (Pruning trials with apple trees.)

Tidsskr. Planteavl, 1952, 55: 265-81, being *Beret. Stat. Forsøgsvirks. Plantekult.* 452.

The two pruning trials A and B carried out at Blangstedgaard from 1919 to 1945 and from 1932 to 1943 respectively were laid down according to the following plan. A. (1) No cutting back at planting and no pruning afterwards. (2) Cutting back of the annual shoots to 30 cm. immediately before planting and no pruning afterwards. (3) Cutting back of the annual shoots to 30 cm. immediately before planting; afterwards cutting back the leader to two-thirds of its length and the lateral shoots to 3-4 buds. After 1931, 6-8 buds

were left on the lateral shoots. Crimson Cousinot on a seedling rootstock, Beauty of Kent on M. IV and Husmoder (Bellefleur de France) on M. IV were the varieties used. As there was no difference between (1) and (2) the data from these two treatments were not tabulated separately to facilitate the comparison pruned *versus* unpruned. With the exception of Beauty of Kent, where the yields of the pruned trees for the entire period exceeded those of the unpruned trees (117.6 and 106.6 kg. per tree respectively), the initially smaller crops of the pruned trees did not catch up the total yields from unpruned trees (Husmoder 97.7 kg. as against 123.0 kg. and Crimson Cousinot 49.2 kg. as against 54.5 kg.). In every case, however, the fruits from pruned trees were larger and the colour was better. Pruning had no effect on fruit drop or biennial bearing.—B. A plantation of 12 apple varieties established in 1919 and left unpruned until 1931, apart from cutting back after planting, was subjected to two treatments: (1) no pruning; (2) thinning out and annual pruning of the leaders to three-quarters of their length and the other shoots to 6-8 buds. The results, details of which are fully tabulated, are very similar to those obtained from Trial A. Pruning tended to reduce total yields but invariably improved quality. The data further show that none of the three rootstocks used, M. IV, M. V and a seedling, affected the response of the variety.

253. ROBERTS, R. H.

Pruning Golden Delicious to secure good apple size.

Proc. Amer. Soc. hort. Sci., 1952, 59: 184-6, illus.

Under Wisconsin conditions older trees of Golden Delicious make little growth and bear biennially, fruit size in on-years being small. In 1950 on heavily budded trees the cutting of all weak growing branches and spurs "in half" resulted in good blossom set, good growth, large leaves and consistently large fruits. In 2 orchards the following off-year crop was also good. [See also *H.A.*, 22: 1238.]

254. DEKKER, P.

Hoge kwaliteit en beste opbrengst door verbeterde systeem-Lepage. (High quality and the best yields by an improved Lepage system.)

Cult. Hand., 1952, 18: 216-18, illus.

The Lepage cordon system of growing apples can be improved by the choice of more suitable rootstocks, and particularly by a modification of the training of the secondary and tertiary branch systems, which start from the middle of the primary arched stem and not from its base as in the former method. The operations during the first three seasons are set out in detail; notes are given on suitable rootstocks, and yields from the 3rd to the 8th year are recorded. For apples, rootstocks EM I, EM II and EM V are suitable. On types EM XI and EM XVI growth is too vigorous and the trees require too frequent and drastic pruning. Varieties which respond favourably to the treatment are Golden Delicious, Cox's Orange Pippin, Jonathan, Winston, Gold Pearmain, Wealthy and Belle de Boskoop.

255. WÄDENSWIL.

Schnittversuche. (Pruning trials.)

Landw. Jb. Schweiz, 1952, 66: 667-8.

In 1939 and 1940 two pruning trials were laid down with U-shaped apple and pear trees on M II and quince A respectively, with distances of 40, 60 and 80 cm. between the branches. Pear varieties tending to be precocious benefited in every respect from keeping the fruiting wood short, whereas with all the apple varieties tested long fruiting wood had a favourable effect on vigour. The distances between branches recommended are: for apple espaliers 60 cm. or more and for pear espaliers 40 or at most 60 cm. Timely rejuvenation of the fruiting wood will delay ageing.

256. MICKLEM, T.

Summer pruning of certain varieties of peaches.

Decid. Fruit Gr., 1952, 2(8): 19.

In recent seasons Kakamas peaches have commonly shown in early summer an abnormal type of growth consisting of a dense mass of water-shoots in the crotch with poor, uneven development of the tops of leaders and main laterals. Among the factors which could cause this is early winter pruning. The following 3 methods of summer pruning have shown promise under test but all are still experimental: (1) the tipping back by a third of their length in October-November of water-shoots arising from the crotch and insides of main leaders; (2) complete removal of some vigorous water-shoots inside the tree early in the season; (3) pruning of over-vigorous water-shoots originating on or growing directly forward from the outsides of leaders.—W. Prov. Fruit Res. Stat., Stellenbosch.

Harvesting and marketing

(See also 285c, k, o, u, y.)

257. WI[CHERS, A. J.], AND DE J[ONG, L.].

Tijdstudie betreffende het plukken van fruit. (A time study on fruit picking.)

Jaarversl. Inst. TuinbTech. Wageningen, 1951, pp. 45-7.

Direct picking into boxes on a platform on a jeep is quicker than picking from ladders and the fruit can be roughly sorted during the process. Picking from the ground is twice as quick as picking from ladders, the average speed from the ground being 2.5 kg./min. When both hands are free for picking a rate of 4 kg./min. can be achieved.

258. DUPAIGNE, P., AND BOULAY, J.

Étude de l'évolution de la maturité des fruits entre la cueillette et la consommation (Campagne 1951—Pêches et abricots). (A study of the maturation of fruits between harvest and consumption. Peaches and apricots, 1951.)

Bull. tech. Inf., 1952, No. 69, pp. 293-305, from abstr. in *Jardins Fr.*, 1952, 6: 194.

The effect of time of harvesting and storage treatment on the maturation of peaches and apricots was studied.

259. BRESSLER, R. G., AND FRENCH, B. C.
Efficiency in fruit marketing. Part II.*

Calif. Agric., 1952, 6(7): 7-8, 10.

In the 1950 season grading or sorting in 8 Californian apple packing houses averaged 94 cents per 1,000 lb. fruit and in 10 pear packing houses 62 cents for 1,000 lb.

* For Part I, see *H.A.*, 22: 3459.

Wages accounted for about 95% of this cost. Differences in costs in the packing houses studied were due mainly to: (1) the adjustment of the sorting gang to the volume of fruit handled; (2) the type of sorting table used, significantly more labour being needed for tables requiring sorters to pick up each individual fruit; and (3) the volume per hour handled by each table. The results of the study suggest that, on the average, labour for grading could be reduced about 25% in pear packing houses and over 50% in apple packing houses.

260. SAMMET, L. L.

Efficiency in fruit marketing. Part III.

Calif. Agric., 1952, 6(8): 10-12, illus.

A study of growers' practices showed that the labour needed for loading and distributing full and empty lugs [field boxes] in the orchard and packing house ranged from 32 to 120 man-minutes per 100 46-lb. lugs of fruit. Road haulage between orchard and packing house required additional labour ranging from 2.5 to 32.5 man-minutes per 100 lugs per mile. The most labour saving method was the use of tractor drawn trailers loaded directly in the orchard and drawn in tandems of 3 units to the packing house. Other methods, in descending order of efficiency, were direct loading of flat-bed trucks in the orchard, transfer with tractor fork-lift attachment from orchard trailers to road trucks, and transfer by hand from trailers to trucks.

261. FRENCH, B. C.

Efficiency in fruit marketing. Part IV.

Calif. Agric., 1952, 6(9): 9-10, illus.

Packing labour and efficiency were studied in pear and apple packing houses in California. Performance standards, based on boxes per packer-hour, are tabulated for different size-counts of pears, packed wrapped in standard 48-lb. boxes, and packed unwrapped in 48-lb. and 24-25-lb. lugs, and for different size-counts of apples packed in standard boxes. Comparing packing from bins, semi-circular tubs or direct from conveyor belts showed the first system to have a significant cost advantage when the hours operated and volume handled per season were low; as the hours operated per season increased tub and bin costs became equal, while with further increases belt costs became the lowest. Other factors which may influence efficiency are indicated.

262. SAMMET, L. L., AND DAVIS, I. F.

Efficiency in fruit marketing. Part V.

Calif. Agric., 1952, 6(10): 10-12.

The annual replacement costs for buildings and equipment in 2 Californian pear and apple packing houses are itemized and compared in relation to output. One house was equipped with hand trucks and the other with fork-trucks.

Storage.

(See also 431, 546.)

263. SMITH, W. H.

The pre-cooling and storage of soft fruit, stone fruit and vegetables.

Kent Fmr., 1952, 1: 247-9.

After a brief consideration of pre-cooling, notes are given on the cold storage qualities of various fruits. Strawberries for dessert can be stored for 2-3 days and for processing up to 7 days. Late cherries keep 7-10

days at 34° F. Plums vary greatly; Czar and Giant Prune will last only about a week at 34° F., Victoria for 3 weeks and damsons 6-7 weeks. Notes are also given on vegetable storage.

264. LAL SINGH AND OTHERS.

Some studies in the preservation of fruits and vegetables.

Indian J. agric. Sci., 1951, 21: 137-53, bibl. 13, illus. [received Aug. 1952].

A "Scheme for Special Work on Fruit and Vegetable Preservation" was started as a wartime project at Lyallpur in 1941. Results of practical importance are here reviewed briefly. They include procedures for dehydrating many kinds of vegetables in a specially constructed tunnel dehydrator, the dehydration of amla (*Phyllanthus emblica*) fruits, the canning of plums, peaches, apricots, pears, blackberries and various oranges and mandarins, and the preparation of citrus squashes, beverages from water melon juice, and pickles and condiments.

265. THOMAS, F. B.

Delaying decay of fruits after harvest.

Progr. Rep. Pa agric. Exp. Stat. 70, 1952, pp. 4, illus.

Delaying decay of fruits by treatments after harvest.

Proc. 93rd annu. Mtg Pa St. hort. Soc., 1952, 9 (1): 62.

Three formulations of the sodium salt of dehydroacetic acid effectively delayed decay in fresh strawberries, cherries, raspberries and peaches stored at 75° and 35° F. At 75° F. strawberries (under 1% concentration), cherries (1-5%) and peaches were usable after 4 days, and black raspberries, though shrivelled, remained free from decay for 10 days. At 35° F. strawberries were usable after 2 weeks, black raspberries after 10 days and red raspberries after 6 days, cherries showed no breakdown after 7 days and peaches were fit for cooking after more than 3 weeks.

266. DULLUM, N., AND RASMUSSEN, P. M.

Frugtopbevaring. Sammenligning af kold-
årlager og almindelig ventileret lager.
Fruit storage. A comparison of the Swedish
type of "cold air" store and the ordinary
ventilated store.) [English summary 1½ pp.]
Tidsskr. Planteavl, 1952, 55: 211-36, being
Beret. Stat. Forsøgsvirks. Plante kult. 450.

In the ordinary ventilated store air circulation is not mechanically controlled, relatively cold air entering through openings in the lower part of the outer walls, while the warmer air escapes through slits in the roof. In the case of the "Koldår" (a Swedish trade name) store ventilation is regulated by 4 thermostats which allow the entry of air only if the temperature outside is lower than inside and if the store temperature is above a certain minimum. Moreover, fans are installed to increase circulation. Boxes are stacked tightly and the air is forced through to come into contact with the fruit. Two seasons' comparative trials with apples, which included several well-known English varieties, showed that a store with automatically controlled ventilation is superior to the ordinary type of store as the optimum temperature is reached much more quickly and is more easily maintained. Rots and physiological disorders were less serious in "Koldår", but shrivelling

and weight loss from evaporation were more pronounced. On balance, "Koldår" yielded 10% more saleable fruit at the end of the storage period. A comparison with refrigerated storage at +3° C. is difficult owing to the different response of different varieties. On the whole, it appears, however, that under Danish conditions apples will keep as long in either type of the ventilated store as in cold storage.—Blangstedgaard Exp. Stat.

267. LARSEN, E.

Frugtlagring på Danmarks største og mest moderne salgsforening. (Fruit storage at Denmark's largest and most modern sales co-operative.)

Erhvervsfrugtavl., 1952, 19: 11-14, illus.

In April, 1952, the horticultural sales co-operative opened a new store at Aarhus, the modern layout and equipment of which is described. The photographic illustrations include an assistant motor-cycling through one of the long corridors.

268. MANN, G.

The ventilation of farm buildings used for the storage of fruit and vegetables.

Agriculture, Lond., 1952, 59: 335-8, illus.

Advice, assisted by diagrams, is given on natural and forced systems of ventilation in fruit and vegetable stores, based on investigations made by the Department of Scientific and Industrial Research at Ditton Laboratory. For natural ventilation rotating cowls for both inlet and outlet air, facing and backing the wind respectively, are more efficient than plain extraction ventilators. For forced ventilation siting the fan in the intake at ground level is probably better than siting it in the exit vent in the roof. Fans must be of sufficient capacity, and inlet branch ducts must not be more than 6 ft. apart to ensure even distribution. The installation of thermostatic control reduces the risk of freezing.

269. FIDLER, J. C.

Factors affecting the efficiency of gas storage of apples and pears.

Kent Fmr, 1952, 1: 243-5.

The importance is stressed of picking at the right stage of maturity and then reducing the temperature of the fruit with a minimum of delay. A serious type of damage in gas-stored pears is gas injury, which is chiefly found in Conference and Williams. It is generally due to insufficient attention to the two above-mentioned factors. Mixtures which should guard against gas injury except when there is excessive delay in storing are 6% carbon dioxide: 15% oxygen for Conference and Williams in stores not fitted with scrubbers, or 5% carbon dioxide: 5% oxygen for Conference if the store has a scrubber. Experience suggests that core flush in Cox's Orange Pippins may be aggravated by a high concentration of oxygen; the oxygen in a scrubbed store for Cox's should therefore be rigidly controlled between 3% and 3½%.

270. CLARKE, W. S., JR.

A comparison of the storage life of standard varieties of apples with their red bud sports.
Proc. Amer. Soc. hort. Sci., 1952, 59: 315-18, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1678 [see also *Proc. 93rd annu. Mtg Pa St. hort. Soc.*, 1952, 9 (1): 64-7.]

In 4 cases out of 5 standard apple varieties kept better

in storage than did their red bud sports. In most cases, however, differences did not become apparent until late in the storage period, by which time most of the commercial apples of these varieties would already have been sold.

271. BAKER, C. E., AND MAXIE, E. C.

An apparent retardation of a physiological spot on Red Rome apples in storage by activated charcoal and shredded oil paper.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 312-14, bibl. 2, being *J. Pap. Purdue Univ. agric. Exp. Stat.* 570.

Limited observations in 2 years suggest that both air purification by activated charcoal and the use of shredded oiled paper at $\frac{1}{2}$ lb. per bushel reduced the amount and severity of Rome spot in storage. This indicates that Rome spot may differ from Spy spot, the incidence of which was not affected by activated charcoal. [See *H.A.*, 18: 2258.]

272. SMOCK, R. M., AND GROSS, C. R.

The effects of the vapors of different quantities of apricots on the ripening rate of apples.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 307-11, bibl. 3.

Data are presented from 3 experiments which showed that the presence of proportionately large weights of ripe apricots had less stimulatory effect on the ripening of pre-climacteric apples than smaller quantities. The fruit was held at room temperatures with O_2 and CO_2 levels kept fairly constant. Measurements of volatiles were made and will be reported elsewhere; it is mentioned here, however, that ethylene was given off in such negligible quantities by the apricots at all times that it could not have been responsible for the depressant effect. In one experiment the use of activated carbon in the recirculation system tended to remove the depressant effect of large weights of apricots.—Cornell Univ.

273. BOYES, W. W.

Woolliness in cold stored peaches.

Decid. Fruit Gr. 1952, **2**(2): 13-17, bibl. 4.

Since the disastrous 1934-35 season when practically all the Peregrine, Pucelle and Elberta peaches arriving on the English market from South Africa were woolly, this condition has been the subject of detailed research. It was proved that if peaches are stored between 33° and 40° F. woolliness will develop in a relatively short time, and today all are exported at 31° F. At this temperature woolliness is no longer a problem in Inkoos, Duke of York, Peregrine and Pucelle, but is still found in Early Dawn, Boland and Elberta (the last comprising 60% of the peaches planted in Western Province). In 1950-51 it was found that Elberta remained in excellent condition for as long as 10 days after dual temperature storage (the commonest schedule being 31° F. for 10 days and 50° F. for 11 days) and these promising preliminary results are being further investigated.—W. Prov. Fruit Res. Stat.

274. HOIJTER, P. J.J.

Invloed van verschillende zijden van de boom op de bewaarbaarheid van appels. (The influence of the side of the tree on the keeping quality of apples.)

Jaarversl. Inst. TuinTech. Wageningen, 1951, pp. 43-4.

With the variety Sterappel, the side of the tree from which the fruit was picked had no effect on its keeping quality. With Goudreinette fruit from the north side kept significantly better than that from the south or east sides or from the middle of the tree, and fruit from the west side kept better than that from the south or middle. It is suggested that fruit from the south and east sides should be harvested before that from the north and west.

275. SENN, T. L., AND SCOTT, L. E.

Post-storage studies with Richared Delicious apples.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 319-26, bibl. 9.

Richared Delicious apples harvested on September 21, 1949, and stored at 30-31° F. were removed from storage on October 13, November 28 or January 7 and held at 45, 50 and 55° F. Measurements were made at 3-day intervals of respiration rates, firmness, per cent. dry matter, succulometer readings and organoleptic evaluations. The longer cold storage periods resulted in lower firmness, succulometer and organoleptic values. Increasing the post-storage temperature increased the respiration rate and reduced the other values. The respiration rate increased during the early part of the post-storage period, and then slightly decreased; the dry weight percentage showed no significant change and the other values declined. The apples maintained acceptable organoleptic ratings for 18 days at 45° F., 9 days at 50° F. and 6 days at 55° F.

Fruit composition.

(See also 80, 285 I.)

276. MAGEE, H. E.

Observations on the nutritive and therapeutic values of fruit and fruit juices.

Reprinted from *Mon. Bull. Minist. Hlth Lab. Serv. Lond.*, 1951, **10**: 209-14, bibl. 11.

This review of the literature on fruit and fruit juices in relation to their value in health and disease includes tabulated details of the composition, with respect to calories, Na, K, Ca, Mg and vitamins, of the whole fruits and fruit juices of apple, blackberry, black currant, gooseberry, orange, plum, raspberry and strawberry.

277. HUELIN, F. E.

Volatile products of apples. III. Identification of aldehydes and ketones.

Aust. J. sci. Res., Ser. B, biol. Sci., 1952, **5**: 328-34, bibl. 6, illus.

The volatile aldehydes and ketones produced by whole Granny Smith apples at 30° C. were identified by paper chromatography and spectral absorption of the dinitrophenylhydrazones, and by conversion of the aldehydes to hydroxamic acids. Acetaldehyde was found to be the major constituent, with smaller amounts of propionaldehyde and acetone. [Author's summary.] C.S.I.R.O., Homebush, N.S.W.

278. BRADFIELD, A. E., AND OTHERS.

Chlorogenic acids in fruit trees.

Nature, 1952, **170**: 168-9.

Workers at East Malling Research Station, Ditton Laboratory and Long Ashton Research Station report the presence of chlorogenic acid in both mature and

immature apple and pear fruits, and of this substance and a substance similar to, or identical with, *isochlorogenic acid* of coffee in leaves and shoots of pear. Details will be given in independent publications elsewhere.

279. UOTA, M.

Temperature studies on the development of anthocyanin in McIntosh apples.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 231-7, bibl. 10.

Mean night temperature was found to correlate closely with red colour development in McIntosh apples. High temperature around 76° F. completely inhibited pigment formation. There seemed to be no correlation between sugar content of the fruit and colour developed at time of fruit maturity. High temperatures during the late growing season increased the incidence of storage scald. [Author's summary.]—Cornell Univ.

280. HULME, A. C.

New amino-acids in young apple fruits.

Nature, 1952, **170**: 659-60, bibl. 9, illus.

Piperidine 2-carboxylic acid and another amino acid of which, so far, it has not been possible to obtain a completely pure preparation.—Ditton Lab., East Malling.

281. ARCIHOVSKAJA, E. V., AND SOKOLOVA, V. E.

The formation of ethylene and acetaldehyde in apple tissues. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, **84**: 765-8, bibl. 5.

This is an examination of the fruit of the variety Antonovka during its development on the tree and afterwards in storage at 0° C. with reference to the effect of temperature and various concentrations of oxygen on the accumulation, in the tissues, of ethylene and acetaldehyde. Samples were kept under similar conditions for 2½ hrs and then immediately frozen at -44° C., after which the ethylene and acetaldehyde were determined. The ethylene content of the pulp and skin from the time the observations were started (9 July) to the end of the period of intense growth (latter half of August) diminished somewhat; later it increased, particularly in the skin. Observations on acetaldehyde were not started until the end of August when the fruit had almost reached its full size; the data, however, showed differences in the behaviour of ethylene and acetaldehyde. During the ripening period the amount of acetaldehyde gradually increased in the skin and pulp, but when the fruit was fully ripe there was a marked rise. At the beginning of January the acetaldehyde content of the pulp diminished significantly, but in the skin it remained about the same. Lowering the percentage of oxygen had no noticeable effect on the concentration of ethylene in the tissues, but it increased the acetaldehyde content of the skin. The processes giving rise to these products of aerobic respiration were accelerated by a rise of temperature.

282. SACYPEROVA, I. F.

The dynamics of the accumulation of phytoncides in the fruits of the common bird cherry. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, **79**: 491-3, bibl. 1.

The volatile fraction of the toxic substance (phytoncide) produced by the bird cherry, *Padus racemosa* [*Prunus padus*], was found to be active in the fruit from the time

of setting until maturity. The test object was *Glaucoma scintillans*.

Processing.

(See also 120, 285p, 388, 1394, 1401.)

283. WEST, C., AND OTHERS.

The dehydration of English fruit.

Spec. Rep. D.S.I.R. Food Invest. **56**, London, 1952, pp. 41, bibl. 5, 1s. 6d.

Experimental work at the Ditton Laboratory, East Malling, has shown that first-class dehydrated products can be obtained from English fruits. The first part of the report deals generally with the methods found to be suitable, while the drying of plums, apples, pears and cherries (Morello) is discussed in turn in four further parts. Full maturity of the fruit is one of the most important factors influencing the quality of the final product. The economic aspect of fruit dehydration in England was not investigated but the authors believe that the drying of plums, and possibly of apples, has distinct commercial possibilities in glut years.

284. FRIEDRICH, E.

Rationelle Verwertung des Fallobstes in der Silofutterbereitung. (The utilization of windfalls as silage.)

Landwirt, 1952, No. 14, pp. 249.

The addition of windfalls to other materials used in making silage is suggested. According to quality, 20-40 quintals of windfalls plus approximately 380 kg. sugar are required to obtain 100 mf silage. O.J.

Noted.

285.

a ALBERTA HORTICULTURAL ADVISORY COMMITTEE.

Alberta horticultural guide.

[*Publ.*] *Minist. Agric. Alberta*, 1952, pp. 31, map.

b BORAX CONSOLIDATED, LTD.

Does your orchard need boron?

[*Publ.*] *Borax Consolidated, Ltd.*, London, 1952 (?), pp. 9, illus. Symptoms and recommendations.

c BRUNK, M. E.

Marketing research for the benefit of fruit growers.

Proc. 93rd annu. Mtg Pa St. hort. Soc., 1952, **9** (1): 18-31.

d CARLONE, R.

Rome Beauty, Morella ed Imperatore. (Rome Beauty, Morella and Imperatore apples.)

Ital. agric., 1952, **89**: 397-407, bibl. 6, illus.

e CHHONKAR, V. S.

Effect of nitrogen fertilization on the area and colour of the leaves of peach trees.

Indian J. Hort., 1952 (2): **2**: 1-7, bibl. 7.

f CLANG, C. A.

Persikeodling. (Peach growing [in Sweden].)

Fruktodlaren, 1952, No. 1, pp. 9-13, illus. In southern Sweden as wall espaliers and bushes.

- g COOMBE, J.
Apricot culture [in New Zealand].
N.Z. J. Agric., 1952, **84**: 325-33, 397-407,
bibl. 3, illus.
- h DARROW, G. M.
Polyploidy in fruit breeding.
Proc. Amer. Soc. hort. Sci., 1952, **59**: 283-4.
- i EVREINOFF, V. A.
L'abricotier. Espèces spontanées, sélection
et observations biologiques. (Wild apricots.
Their selection and biological characteristics.)
Fruits d'Outre Mer, 1952, **7**: 417-23, bibl. 25.
- j ILLINOIS FRUIT INDUSTRY COMMITTEE.
Recommended late varieties of apples for
commercial planting in Illinois.
(*Publ. Ill. Fruit Industr. Cttee*, 1952, pp. 3.
- k JEFFERY, C. W.
Packhouse construction and organization.
Decid. Fruit Gr., 1952, **2** (1): 6-8.
- l KOBLIC, J.
Višeň obecná, složení plodů se žretem na
kyanovodík, vitamin C a d-sorbit. (The
common sour cherry fruit and its HCN, vita-
min C and d-sorbitol content.) [Russian sum-
mary $\frac{1}{2}$ p.]
Sborn. čes. Akad. Zeměd., 1952, **25**: 121-30,
bibl. 40.
- m KOLESNIKOV, V. A.
The root system of fruit plants and cultural
measures to obtain high yields. [Russian.]
Sad i Ogorod, 1952, No. 9, pp. 27-30.
A popular article.
- n KRONENBERG, H. G.
Teelt en veredeling van fruitgewassen in
Zwitserland. (Cultivation and breeding of
fruit crops in Switzerland.) [English sum-
mary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1950, **13**: 97-121, bibl.
13, illus., being *Meded. Inst. Vered. Tuin-
bouwgew.* **22**, 1950, pp. 25 [omitted in
error from *H.A.*, Vol. 21].
An extensive review.
- o MADSEN, H. C.
Vurdering af forskellige sortermaskiner for
frugt. (An evaluation of different fruit
grading machines.)
Frukt og Baer, 1952, **2**: 22-32, illus.
- p PHAFF, H. J.
Fruit and vegetable dehydration principles
and advances (1864-1945).
Chron. Bot., 1951, **12** (4/6): 306-29, bibl.
numerous, issued as *Biologia*, 1950/51,
Vol. 2.
A comprehensive review.
- q RUEF, J. U.
Cherry production.
Circ. Pa agric. Ext. Serv. **403**, 1952, pp. 18,
illus.
Varieties and cultivation.
- r SCARAMUZZI, F.
Le basi istogenetiche dell'innesto "ad
occhio". Ricerche sul pesco. (The histo-
genetic process in budding on peach trees.)
[English summary 8 lines.]
Ann. Sper. agrar., 1952, **6**: 517-37, bibl. 9,
illus.
- s SEITZER, J.
Bodenpflege durch Bodenbedeckung, wirt-
schaftliche Klimameliorationen und andere
Fragen des praktischen Obstbaues. (Soil
covers, improvement of the micro-climate
and other pomological problems.)
Ber. dtsh. Wetterdienst. U.S. Zone **32**,
1952, pp. 42-3.
- t SNYDER, J. C., BRANNON, D. H., AND
HARRIS, M. R.
Growing peaches [in the State of Washing-
ton].
Ext. Bull. Wash. St. Coll. **462**, 1952, pp. 29,
illus.
- u SVENSK FRUKTKONTROLL.
Bestämmer om sortering och packning
av äpplen och päron jämte märkningsbes-
tämmer. (Regulations on the grading and
packing of apples and pears [in Sweden].)
Fruktodlaren, 1952, pp. 105-8.
- v TUKEY, L. D.
Points of interest in chemical thinning of
apples.
Proc. 93rd annu. Mtg Pa St. hort. Soc., 1952,
9 (1): 35-41.
- w* VEIHMAYER, F. J., AND HENDRICKSON, A. H.
The effects of soil moisture on deciduous
fruit trees.
[*Mim. Pap.*] *13th int. hort. Congr.*, London,
1952, pp. 9, bibl. 24.
[Under Californian conditions.]
- x ŽAVORONKOV, P. A.
New hardy apple varieties for the southern
Urals. [Russian.]
Agrobiologija, 1950, No. 4, pp. 94-9, bibl. 1,
illus.
- y ZIMMER, S. J.
Reviewing the fruit graders. 1. For the small
grower. 2. For the medium man. 3. For
large-scale growers.
Fruitgrower, 1952, No. 2955, pp. 259-60,
No. 2956, pp. 328-30, and No. 2957, pp.
367-8.

* See note, p. 3.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(See also 13, 22, 90, 100, 122m, 130, 356a, c, f, h, j, k, l, q, r, 666, 670, 1091.)

286. LAARMAN, N. A.

De economische perspectieven van verschillende kleinfruitgewassen in verband met de vraag in binnen- en buitenland. (The economic prospects of some small fruits with respect to the demand in the Netherlands and abroad.) [English summary 1½ pp.]

Meded. Inst. Vered. Tuinbouwgew. 32, 1952, pp. 52-8.

Information is given on acreage, production, utilization and trade in the Netherlands of the following small fruits: strawberries, raspberries, black currants, red and white currants, and gooseberries.

287. TER PELKWIJK, A. J.

Perspectieven voor nieuwe klein-fruit gewassen. (Possibilities for new small fruit crops.) [English summary ¾ p.]

Meded. Inst. Vered. Tuinbouwgew. 32, 1952, pp. 80-91, bibl. 17, illus.

It is pointed out that there are many wild fruits from which it might be possible, by breeding, to produce useful commercial forms. The possibilities are discussed of growing and improving the following fruits in Holland: the highbush blueberry (*Vaccinium corymbosum*), the cranberry (*Vaccinium macrocarpum*), the blackberry (*Rubus* spp.), the juneberry (*Amelanchier laevis* and *A. stolonifera*), the sea buckthorn (*Hippophae rhamnoides*), the cornelian cherry (*Cornus mas*), *Elaeagnus multiflora*, the highbush cranberry (*Viburnum trilobum*), the Japanese quince (*Chaenomeles lagenaria*), and the elderberry (*Sambucus canadensis*).

288. KRONENBERG, H. G.

In welke opzichten is veredeling van klein-fruit gewenst en mogelijk? (The extent to which breeding of small fruits is desirable and possible.) [English summary 2 pp.]

Meded. Inst. Vered. Tuinbouwgew. 32, 1952, pp. 59-79.

The characters which are required in strawberries, raspberries, red currants, black currants, and gooseberries in Holland, and the possibilities of obtaining these characters by breeding and selection are discussed. The desirable characters of a large number of Dutch and foreign varieties are tabulated.

289. KRONENBERG, H. G.

Variaties in rassen van klein fruit. (Variations in small fruit varieties.) [English summary ½ p.]

Meded. Inst. Vered. Tuinbouwgew. 17, 1950, pp. 68-76 [omitted in error from H.A., Vol. 21].

A review is given of previous observations on mutations in small fruits. Other possible cases of mutation which have occurred in Holland recently are some particularly fruitful clones of Deutsch Evern strawberry, and a clone of Jucunda which was largely self-sterile.

290.* DARROW, G. M.

Breeding of small fruits in the United States.

[Gen. Pap.] 13th int. hort. Congr., London, 1952, pp. ?

Among berry crops, strawberries are most important, currants and gooseberries are of little importance as compared with their status in Europe, but blueberries, cranberries and blackberries are relatively important. Since about 1930, varieties originated by State and Federal research stations have become increasingly important and already produce about 55% of the strawberry crop, 95% of the red raspberry, 50% of the purple raspberry, 30% of the black raspberry, 5% of the blackberry, 90% of the blueberry, and 2% of the grape. The success of the work has led to steady expansion of research programmes in many experiment stations. About 118 varieties of small fruits introduced by experiment stations are of at least some importance and, of course, others will become so. Breeding is largely for specific purposes, as illustrated by the Temple strawberry bred for resistance to the red stele root disease, the Cardinal grape bred as an early shipping table variety, the Burgaw bred as a perfect-flowered muscadine grape, and the Washington and Willamette red raspberries bred for hardiness in late fall in Oregon and Washington. Mass breeding with tests to eliminate large numbers of undesirable seedlings when young is very effective. Growing seedling strawberries in greenhouse benches in red-stele-infected soil has been effective in eliminating susceptible seedlings. Regional small fruit field meetings have stimulated workers. Use of foreign species for new genetic material is becoming important, especially in raspberry breeding. Hexaploid × diploid crosses seem promising in bringing desirable new genes into cultivated blueberry varieties. Breeding tetraploid grapes to obtain larger fruited varieties is being attempted.

291. WILLIAMS, B. L., ICE, C. H., AND WENDER, S. H.

The isolation and identification of quercetin and isoquercitrin from black currants (*Ribes nigrum*).

J. Amer. chem. Soc., 1952, 74: 4566-7, bibl. 11.

The relatively high vitamin P activity of black currants has been attributed to the flavonoid compounds present, two of which were isolated and identified by the authors.—Univ. of Oklahoma.

292. HOBBS, E. W.

The blueberry.

Fruit Year Book, 1953, 1952, pp. 84-8, bibl. 6, illus.

A description is given of a small trial of high-bush blueberries, *Vaccinium corymbosum*, of 8 well-tried varieties from Canada started on the borders of Exmoor in 1948. Under moorland conditions the plants failed to become established but under garden conditions they did well.

* See note, p. 3.

293. DARROW, G. M., WILCOX, R. B., AND BECKWITH, C. S.

Blueberry growing.

Fmrs' Bull. U.S. Dep. Agric. 1951, revised 1950, pp. 38, bibl. 2, illus. [received Sept. 1952].

Following a short account of the 6 more important species of *Vaccinium* referred to as blueberries, the available information on rabbiteye varieties and their culture and more especially on highbush varieties and their culture is summarized, together with concise notes on diseases, pests and their control.

294. O'ROURKE, F. L.

Propagation studies with the low dryland blueberry, *Vaccinium vacillans* Torr.

Proc. Amer. Soc. hort. Sci., 1952, 59: 150-2, bibl. 3.

The low dryland blueberry, *V. vacillans*, may be of value as an anti-erosion crop for steep land, particularly if superior clones are selected and propagated vegetatively. The trials reported here show that plants can be raised from 3 in. rhizome cuttings taken in November, stored in moist peat over winter and set in cold frames in a peat-sand mixture in April, or from 4 in. hardwood cuttings taken in April. The rhizome cuttings gave slightly higher success, especially if set vertically with distal ends upwards rather than horizontally or without reference to polarity, but the hardwood cutting method is to be preferred owing to the saving of time, space and labour. Among the hardwood cuttings basal 1-year-old wood gave better results than median or terminal wood or than comparable 2-year-old wood.

295. O'ROURKE, F. L.

The effects of the position of the basal cut on rooting of hardwood cuttings of blueberry.

Proc. Amer. Soc. hort. Sci., 1952, 59: 153-4, bibl. 6.

In one year the take of highbush blueberry cuttings of 4 varieties was higher when the basal cut was made just above a bud rather than just below a bud. In the next year the result was reversed in 4 out of 5 varieties, but the differences were slight. The "above the bud" method represents an economy in time, labour and cutting material.

296. CAIN, J. C.

A comparison of ammonium and nitrate nitrogen for blueberries.

Proc. Amer. Soc. hort. Sci., 1952, 59: 161-6, bibl. 16, being *J. Pap. N.Y. St. agric. Exp. Stat.* 894.

Evidence is presented which indicates that nitrate N is inferior to ammonium N for blueberries and may actually be harmful. Ammonium N may be associated with Fe nutrition inside the plant, though having no effect on Fe availability in, or absorption from, the soil solution. Further work is needed on the interrelationships between soil acidity, form of N and Fe nutrition, before definite conclusions can be drawn.

297. YOUNG, R. S.

Growth and development of the blueberry fruit (*Vaccinium corymbosum* L. and *V. angustifolium* Ait.).

Proc. Amer. Soc. hort. Sci. 1952, 59: 167-72, bibl. 5.

The development of fruits of 3 varieties of blueberry was studied at Michigan State College in 3 successive years. The growth curve was of a sigmoid type divided into 3 stages similar to those described for peach, cherry and fig, namely rapid growth followed by retarded growth followed by further rapid growth. Fruits receiving full sunlight tended to be the largest. There was no definite order of maturation among individual fruits and no correlation between fruit size and location within a cluster. Late blooming clusters matured their fruits more evenly. Rainfall influenced fruit size but did not appear to affect the duration of stages II and III of fruit growth.

298. DE BAKKER, G.

De bramenteelt. (The culture of bramble fruits.)

Meded. Tuinbouwvoorlicht. Dienst 48, 1950, pp. 52, bibl. 38, illus., fl. 1.75 [received 1952].

Bramble fruits have only been grown in Holland during the last 20 years, and the area under cultivation is only about 50 ha. This is expected to increase, however, as the processing industry expands. Information is here given on forms and varieties of dewberries, blackberries and hybrid berries, culture, pests and diseases, and economics of production. Himalaya Giant is the only variety that has given really good results in Holland. It is concluded that there are good prospects for bramble culture on a small, intensive scale, but that the labour requirements are too exacting for large scale production.

299. CAILES, R. L.

The cultivation of the Cape gooseberry.

J. Agric. W. Aust., 1952, 1(n.s.): 363-5, illus.

The Cape gooseberry (*Physalis peruviana*) has been grown for many years in Western Australia. It is briefly described and advice is given on planting, cultivation, soils, pests, harvesting and marketing. It thrives only in well-drained soils, a gentle slope being most suitable because of natural drainage. On flatter ground some form of artificial drainage is necessary, as by planting on ridges.

300. SCHMIDT, M.

Kreuzungen zwischen Johannis- und Stachelbeerarten. (Crosses between currant and gooseberry species.)

Dtsch. Baumsch., 1952, 4: 280-3, bibl. 4, illus.

A brief account is given of breeding work at Münchenberg aiming at the production of a mildew-resistant gooseberry. In the course of this work a few gooseberry × black currant hybrids were obtained in 1942 and a few parthenocarpic fruits have since been formed. In appearance the bushes are somewhat like spineless gooseberries. It is hoped that chromosome doubling may restore fertility to the hybrid, which would then constitute a new synthetic species.

301. GRUNNET, H. Ø., AND VENDELBOE, B.

Gødningforsøg med stikkelsbaer og ribs 1937-48. (Manurial trials with gooseberries and currants 1937-48.) [English summary 2½ pp.]

Tidsskr. Planteavl, 1952, 55: 591-620, being *Beret. Stat. Forsøgsvirks. Planteakult.* 459.

The bushes were planted in 1937 at Blangstedgaard and Spangsbjerg Research Stations on soils that had been

treated uniformly since 1922. Crop figures relate to the 10-year period 1939-48. At Blangstedgaard, which has a comparatively mild climate, the soil is a heavy loam over clay, while that at the less protected Spangsbjerg is a good sandy loam over a mixture of sand and clay. The object of the trials was two-fold, viz. (A) to compare stable manure with artificial fertilizers and (B) to study the separate effects of N, P and K. As the black currants suffered severely from mites and virus diseases the results presented refer only to gooseberries and red currants.—A. From 1922 to 1945 stable manure was applied at the standard rate of 10 tons/hectare per year later increased to 15 tons, with additional treatments of half and double the standard rate. NPK was supplied in equivalent amounts and another treatment combined one-half stable manure with one-half artificials. Yield figures show for both gooseberries and red currants that the best results were given at Blangstedgaard by organics and at Spangsbjerg by artificials. The apparent inconsistency of the results may be explained by the fact that from the start the soil of the manure plots at Blangstedgaard was somewhat richer in nutrients, especially K, than that of the NPK plots, while the opposite was true at Spangsbjerg. Moreover, the improvement by manure of the physical properties of the low-humus soil at Blangstedgaard must also be taken into account. Beyond doubt the data show the high fertilizer requirements of gooseberries and red currants, particularly at Blangstedgaard where yields of red currants were raised from 37.0 kg. per 100 m² at the standard rate of artificials to 96.1 kg. on application of twice the standard rate.—B. Up to 1944 the standard rates of application per hectare year were: N, 50 kg.; P₂O₅, 25 kg.; K₂O, 50 kg.; thereafter P₂O₅ and K₂O were raised to 40 and 100 kg. respectively. The soils at both research stations were potash-deficient, the deficiency being more pronounced at Blangstedgaard. Consequently N application produced a decrease in yield at Blangstedgaard and a considerable increase at Spangsbjerg. The response to P₂O₅ was negligible at Blangstedgaard but significant at Spangsbjerg. The effect of K₂O applied at the standard and double standard rates on gooseberries is evident at both places. Red currants at Spangsbjerg benefited even more from a standard application of K₂O. The tabulated results include data on soil analysis.

302. MATHERS, B. A.

A study of fruit-bud development in *Rubus idaeus*.

J. hort. Sci., 1952, 27: 266-72, bibl. 6, illus.

Fruit bud development was studied in the raspberry varieties Lloyd George, Malling Promise and Malling Landmark grown in Angus, Scotland. "Differentiation of the floral growing point occurs from the middle of September onwards, development following a definite gradient in the upper third of the cane, the maximum development being in the middle of this region. The inflorescence is formed in definite stages, the first-formed flower being terminal and developing most quickly. The later ones are formed basipetally in an irregular spiral and develop more slowly. The mature inflorescence consists of 7 or 8 flowers, the top 3 or 4 being the best developed at the green-bud stage. Torus, sepals and stamen rudiments are initiated before winter sets in, but further development is delayed until spring. The androecium precedes the gynoecium in maturation

by about 4 weeks. Development of the bud slows down in the beginning of November but, as buds can be forced after the middle of December, it seems that the period of true dormancy (if it exists) is short. The results suggest that if the potential crop of flowers can be influenced by nutritional factors, manures might profitably be applied in late summer. A balance would have to be sought between the possible enhancement of flower production and the tendency to stimulate late season growth." [Author's summary.]—University College, Dundee.

303. HUGHES, H. M.

Training and supporting raspberries.

Fruit Year Book, 1953, 1952, pp. 89-91, illus.

Methods of training and supporting the vigorous modern canes are discussed. One school of thought favours hard tipping to 6 in. above the top wire and the other favours retaining as much of the length of the cane as possible and thinning out individual canes. A modification is described of the hill-grown, arch-tied method of support; the full length of the cane is retained and excessive vigour is not an embarrassment.

304. MINISTRY OF AGRICULTURE, LONDON.

Soft fruit growing. Strawberries.

Bull. Minist. Agric. Lond. 95, 4th edition revised 1952, pp. 38, illus., 2s. 6d.

The fourth edition of this bulletin was published in 1949 [see *H.A.*, 20: 106]. In the present revision, the few changes that have been made are all concerned with strawberry pests or diseases. Auchincruive Climax has now been promoted from an intermediate variety in yellow edge resistance to a tolerant variety.* The use of TEPP and parathion sprays are now given as alternatives to nicotine fumigation for aphid control and a post-harvest organo-phosphorus spray has consequently been added to the routine spray programme. The occasional incidence of the stem and bulb eelworm (*Ditylenchus dipsaci*) as a strawberry pest is noted. The only change in the excellent series of illustrations is the replacement of the photograph demonstrating nicotine fumigation by one showing 3 different planting systems.

305. HYAMS, E.

Strawberries from June to November.

Country Life, 1952, 112: 1098-9.

The author gives us another year's observations [see *Ibidem*, 110: 1374; *H.A.*, 22: 215] on the growth of perpetual large-fruited strawberries in the south of England. Among newcomers are varieties from Germany and America and a new one from France introduced by M. Simmen as Géant Framboisé. This is said to have an exquisite flavour similar to that of the old Hautbois varieties. Medium to heavy loam and even heavy clays are suitable soils for such strawberries and very heavy organic manuring is essential, supplemented by blood and bone meal and flour. They should be given full exposure to sun and no shade, irrigation being necessary during dry spells. The advantages and disadvantages of methods of growing are discussed, viz. in the row like ordinary strawberries or that adopted in Austria, where a square yard is devoted to each plant. No scientific information would appear to be as yet available on the virus status of these varieties. In this respect the author is by no means dismayed by his experience to date, adopting what he considers to be

* We understand it will be demoted in the 5th edition.—Ed.

the French attitude which, briefly, is to consider the problem from the point of view of the plant, not that of the virus. "Provided", he writes, "that susceptible varieties are not grown, provided that the varieties grown, while having all or some of the viruses in them, still appear and behave well, what does the virus matter." [Heresy most outrageous, yet on no account should the intelligent refrain from reading this most stimulating, practical article.]

306. MICKLEM, T.

Strawberry culture.

Fmg S. Afr., 1952, 27: 365-8, bibl. 4, illus.

Strawberry growing in the western Cape Province and summer rainfall areas of South Africa has revived to some extent in recent years with the introduction of two varieties showing a high degree of resistance to virus diseases. These varieties are Everbearing and Koeël, both of obscure origin. A general account is given of their soil and water requirements, planting, cultivation, irrigation, manuring, harvesting and diseases and pests. As they are always cropped in the year of planting, close spacing of 18×4 in. is recommended. In the second year a modified matted row system is developed by removing alternate rows immediately after the first crop, thinning out plants in the remaining rows to 12 in., allowing runners to develop and later thinning them to 4 to 6 in., and cutting out pathways 12 in. wide for access and irrigation.

307. FALCH, J., AND STRAUSS, E.

Sortenvergleich- und Leistungsprüfungen im Erdbeersortiment. (**Strawberry variety trials.**) [English summary 5 lines.]

Mitt. Klosterneuburg, 1952, 2: 239-44, illus.

Among other interesting varieties tested the trials included a promising seedling from the Erwin Baur Institute, Müncheberg, which is believed to be identical with the new German variety Regina. The tests are being continued.

308. THORSRUD, J.

Sortsørsøk med jordbaer I. (**Strawberry variety trials I.**)

Frukt og Baer, 1952, 2: 87-91, bibl. 4, illus., being *Meld. Stat. Forsøksk. Kise* 3.

In 1950 and 1951 the new Danish strawberry varieties Freja, Rubin and Ydun were compared with Abundance and other standard varieties. The Danish strawberries outyielded the rest, but Freja and Rubin were so liable to fruit rot that their commercial value in Norway is very doubtful. Tests with Ydun are to be continued.

Vines.

(See also 3, 128, 356b, d, e, g, i, m, n, p, s, 1370, 1374, 1421.)

309. DU PLESSIS, S. J.

Viticulture in the Union of South Africa.

Brit. agric. Bull., 1952, 5: 228-34, bibl. 21, illus.

A general account is given of the history of the industry, production, cultivation and harvesting practices, vine diseases and pests and the certification of nurseries.

310. READ, J. H.

Outdoor grapes in Britain.

Fruit Year Book 1953, 1952, pp. 92-4.

Success chiefly depends on choice of variety and method of pruning. The most suitable site is a sheltered one with a southern aspect and a soil that is not cold and wet. North of a line drawn from North Wales to the Wash grapes will not usually succeed in the open without some protection. Successful dessert varieties are Pearl of Czaba, Madeleine Royal, Golden Chasselas, Chasselas Rose, Muscat Hamburg. The Guyot system of pruning is the most suitable.

311. HYAMS, E.

A note on some hybrid grape-vines.

Fruit Year Book 1953, 1952, pp. 95-9.

After a short summary of hybridization since the phylloxera invasion notes are given on some hybrids suitable for outdoor cultivation in England with a southern exposure but without a wall or other protection. All are early and disease-resistant. They are Seyve-Villard 5,276, Weibel 5,279, Seibel 13,053, Baco No. 1, Ravat 6, Ravat Noir 262, Tissier-Ravat 578 and Seyve-Villard 20,473.

312. COSMO, I.

Aspetti e problemi della viticoltura e dell' enologia dell'Argentina e del Brasile. (**Vine growing and wine production in Argentina and Brazil.**)

Riv. Vitic. Enol., 1952, 5: 273-82, 313-18, 345-52, illus.

Viticultural statistics are followed by notes on the chief varieties and rootstocks, methods of cultivation and wine making, and the phylloxera problem in Argentina, the world's fifth most important wine producing country, and in Brazil where the industry is not so important.

313. PRATOLONGO, U.

Le variazioni periodiche della produzione della vite. (**Periodicity in Italian vine production.**)

Atti Accad. ital. Vite, 1950, 2(2): 235-42, bibl. 14.

Statistics and graphs show the variation and apparent periodicity in Italian vine production. A probable cycle is 11 years, a period which coincides with that of solar activity.

314. WEGER, N.

Weinernten und Sonnenflecken. (**Vintage years and sun spots.**)

Ber. dtsch. Wetterdienst U.S. Zone 38, 1952, pp. 229-37, bibl. 10.

Records going back to 1719 of a vineyard on the Rhine show that no statistically significant correlation exists between sun spots and good vintage years. The correlation coefficient between grape yield and wine quality was determined as +0.357. Hot and dry summers are not necessarily followed by a good vintage.

315. WÄDENSWIL.

Temperaturmessungen in ostschweizerischen Rebgebieten. (**Temperature measurements in the vine areas of eastern Switzerland.**)

Landw. Jb. Schweiz, 1952, 66: 585-92, illus.

At Wädenswil H. Pallmann's method of temperature measurement (*Soil Res.*, *Berl.*, 1940, 7: 53) is now being tested; it is based on the rate of decomposition of saccharose into glucose and fructose. It is hoped that several years' records will show a closer relationship of

temperature to vine yields and quality than did the mean temperatures calculated from readings by the conventional instruments.

316. NEUBAUER, H. F.
Über ein ursprüngliches Vorkommen der wilden *Vitis vinifera* L. in Ost-Afghanistan. (Wild *Vitis vinifera* indigenous in Eastern Afghanistan.) [English summary 3 lines.] *Mitt. Klosterneuburg*, 1952, 2: 139-46, bibl. 6, illus.

Vitis vinifera has been found growing wild in deciduous forests in the province of Nuristan under conditions which suggest that the species is indigenous in this area.

317. STOVER, L. H.
Breeding has produced better grape varieties for Florida. *Proc. Fla. St. hort. Soc.*, for 1951, pp. 269-71, bibl. 2, illus.

A short account is given of the history of vine breeding in Florida culminating in the production of promising hybrids between Pixiola ♀ (*Vitis simpsoni*) and Golden Muscat ♂. The most promising of these hybrids, named Lake Emerald, is briefly described.

318. STONER, W. N., AND STOVER, L. H.
Field plot observations indicate that new hybrid grapes are vigorous in Florida degeneration areas. *Proc. Fla. St. hort. Soc. for 1951*, pp. 266-8, bibl. 3, illus.

There is evidence that grapevine degeneration in Florida is due to Pierce's virus disease. The new Pixiola × Golden Muscat hybrids are proving far more vigorous than existing varieties. [See also *H.A.*, 22: 2319.]

319. DALMASSO, G., AND COSMO, I.
Indagine sui vitigni da vino coltivati in Italia. (A study of the wine grape varieties grown in Italy.) [English summary $\frac{1}{2}$ p.] *Ann. Sper. agrar.*, 1952, 6, Suppl., pp. XXIX, illus.

The Ministry of Agriculture and Forestry and the Italian Academy of Vines and Wine are collaborating in the enquiry. About 330 wine varieties are in cultivation, 195 being limited to a single province. In some provinces only 6-8 and in others as many as 15-20 or more varieties are grown. In order of their importance the varieties of which the annual wine production exceeds a million quintals are Sangiovese (grown in 46 provinces), Barbera (35), Trebbiano toscano (41), Negro amaro (4), Primitivo (8), Malvasia (41), Montepulciano (19), Trebbiano romagnolo (4), Aglianico (9), Dolcetto (10) and Nerello mascalese (3). The chief hybrid varieties are Clinton (700,000 quintals, 17 provinces), Isabella (260,000 quintals, 20 provinces) and Baco (100,000 quintals).

320. MANZONI, L.
Gli incroci tra varietà di vinifera a Conegliano. (Vine breeding at Conegliano.) *Atti Accad. ital. Vite*, 1950, 2(2): 169-85, illus.

The chief aim is to breed white and black wine varieties to replace local ones. After a short description of the methods used details are given of the crosses made since 1924 and their results.

321. MIHAİLOVA, P. V.
Hybrid seedlings for unprotected vine growing in Central Asia. [Russian.] *Vinodelie i Vinogradarstvo*, 1952, No. 9, p. 45.

Among new vine varieties to be cultivated without winter cover in Central Asia the hybrid seedlings 10-3, 11-1 and 7-33, all developed from combinations of Tagobi and Malengr, show promise.

322. KUZJMIN, A. JA.
Changes in the date of maturity and fruit quality in vine seedlings. [Russian.] *Vinodelie i Vinogradarstvo*, 1952, No. 4, pp. 34-6.

The two seedlings in which the described changes, due to external conditions, have occurred are hybrids No. 54 (Čuaš × Rupestris du Lot) and No. 8 (Russian Concord × Ezandari belyi). No. 54 selected in 1938 for early maturity lost its earliness, while No. 8 planted out for the first time in 1940, has shown subsequent improvement in bunch size, colour and weight of berries.

323. CAPUCCI, C.
L'innesto legnoso-erbaceo della vite. L'innesto legnoso-erbaceo a spacco pieno della vite. II. Nota. (The woody-herbaceous cleft grafting of vines.) [English summaries $\frac{1}{2}$ and $\frac{1}{2}$ p.] *Riv. Fruttic.*, 1952, 14: 97-137, 149-58, illus.

(1) Detailed results are given of research undertaken in the Bologna, Ravenna and Latina Provinces between 1941 and 1951 on the "woody-herbaceous" grafting of vines, a method in which a woody scion is grafted on a herbaceous stock. The stocks used were Kober 5 BB, 420 A, 17-37, 101-14 and Du Lot, Albana, Chasselas and Sangiovese being among the 15 to 20 varieties used. Grafting is done in mild, calm, dry weather in May. The stocks are vigorous, rooted cuttings; they should be pruned while dormant to one stem with 1-2 shoots and defoliated before grafting. The shoots should still be quite green when grafting takes place by the cleft method at their fourth internode. The scions, which should be 4-5 cm. long and fully woody, should carry a single bud which should have been swelling for about a fortnight before grafting. (2) The development of the tissues after grafting was studied microscopically and is described. After several years the union is perfect. The stage reached in the first year depends on the state of the plant at the time of grafting.

324. TRUEBA AGUIRRE, J., FEDUCHY MARIÑO, E., AND FERNANDEZ-CANO, L. H.
Acción de las heteroauxinas y otros tratamientos de las estacas de vid para favorecer su enraizamiento. (The effect of heteroauxins and other substances in stimulating rooting in vine cuttings.) [French summary $\frac{1}{2}$ p.] *Bol. Inst. Invest. agron. Madrid*, 1951, 9: 315-69, bibl. 22.

Detailed results are given of experiments begun in 1950 at the Ampelographic and Viticultural Centre, Madrid [see *H.A.*, 19: 953 and 2836 for the results of previous experiments]. β -indole-3-acetic acid at 25 mg. per l. was more efficacious than K permanganate on 41-B de Millardet and 161-49 Couderc, but the previous

conclusion that permanganate treatment could be of use in some cases was confirmed. β -indole-3-butyric acid was more efficacious at 5 and 10 than at 15, 20 and 25 mg. per l. on 100-Richter. α -naphthaleneacetic acid gave the best results at 5 and 10 mg. per l. and was injurious at 150 and 180 mg.

325. COSMO, I.

Ulteriori indagini sull'impiego di sostanze rizogene nella preparazione di barbatelle di vite innestate e franche. (Further experiments on the use of root-promoting substances in the preparation of grafted and ungrafted cuttings.) [English summary 13 lines.]

Ann. Sper. agrar., 1952, 6: 591-613, bibl. 22.

The results of 2 series of experiments at Conegliano Experimental Station in 1940 and 1948 did not justify the commercial use of growth substances in vine nurseries.

326. MÜLLNER, L.

Wuchsstoffversuche bei der Rebenveredlung und Stecklingsvermehrung. (The use of growth substances in the propagation of the vine by grafting and cuttings.) [English summary 10 lines.]

Mitt. Klosterneuburg, 1952, 2: 146-53, bibl. 5, illus.

The treatment of scion and rootstock with the proprietary hormone preparations Florigen and Hoechst Nr. 2608 did not yield any striking results but the improvement achieved is considered to be economically significant. The treatment of *Vitis silvestris* cuttings, which are difficult to root, proved beneficial.

327. PRATT, R., DUFRÉNOY, J., AND SAH, P. P. T.
Growth regulating properties of some thiosemicarbazones.

Plant Physiol., 1952, 27: 622-5, bibl. 7, illus.

The growth regulating properties of a number of thiosemicarbazone derivatives were tested on dormant cuttings of Thompson Seedless grapes, the materials being applied in a paste of Carbowax 1500 to the apical ends of the cuttings which were standing in various levels of KNO_3 solution. The thiosemicarbazones frequently favoured early growth of the lower buds at the expense of the apical buds. They also favoured early development of flower initials at the expense of leaf development. The 4 compounds outstanding in the promotion of early flower development were, in decreasing order of efficiency, the thiosemicarbazones of 2,4-dichlorobenzaldehyde, of 3,4-dichlorobenzaldehyde, of 4-chlorobenzaldehyde, and of phenyl acetone. None of these compounds seemed to exert any significant effect on root development. The level of nitrate supplied to the cuttings seemed to have little effect on the response of the cuttings to the compounds tested.—College of Pharmacy, Univ. Calif.

328. FLEROV, A. F., AND KOVALENKO, E. I.

The effect of α -naphthaleneacetic acid on the movement of sugars in vine cuttings. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 85: 221-4, bibl. 3, illus.

The trials described show that α -naphthaleneacetic acid treatment causes a re-distribution of stored nutrients in vine cuttings. The sugars flow into the lower treated

part and are rapidly dispersed to callus and rootlets. In treated cuttings root and shoot formation was simultaneous, and they developed into stronger plants, entering earlier into bearing and producing higher yields than untreated plants in which shoot development preceded root formation. The α -NAA concentrations used successfully for the stimulation of rooting varied between 50 and 200 mg. per l. A higher, 300 mg. per l., concentration caused an accumulation of sugars in the lower treated part of the cuttings, resulting in excessive callus formation and drying off of the upper, untreated part.

329. FLEROV, A. F., AND KOVALENKO, E. I.

Anatomical alteration in tissues of grapevine cuttings after treatment with α -naphthaleneacetic acid. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 85: 433-6, bibl. 1, illus.

In the soft tissues of the callus developing on vine cuttings, treatment with α -naphthaleneacetic acid stimulates the development of root initials by loosening the tissues and so promoting the access of oxygen. To obtain young vines with vigorous root systems, treatment with α -naphthaleneacetic acid before planting is necessary. During the rooting and early development of young vines, the soil should be kept loose and friable to permit good aeration.

330. OINOUE, Y., AND YATOMI, Y.

Lime treatment for the cuttings of *Vitis berlandieri*. [Japanese, with English summary 12 lines.]

J. hort. Ass. Japan, 1952, 21: 53-4, bibl. 9.

Cuttings from green shoots rooted better than those from mature shoots. Improved rooting was obtained by treatment with 3% lime and with 3% lime plus 10% sucrose.

331. BREVIGLIERI, N.

Contributo alla ricostituzione viticola in Toscana. Ricerche sui portinnesti dei vitigni del Chianti nelle province di Firenze e Siena. (Contribution to the reconstitution of vine-growing in Tuscany. Research on the rootstocks of the Chianti varieties in the provinces of Florence and Siena.)

Atti Accad. ital. Vite, 1950, 2 (2): 112, bibl. 72, illus.

Particulars are given of the performance of the hybrid rootstocks used with the Chianti varieties, Sangiovese, Canaiolo, Trebbiano, Malvasia and Colorino.

332. LOOMIS, N. H.

Effect of fourteen rootstocks on yield, vigor, and longevity of twelve varieties of grapes at Meridian, Mississippi.

Proc. Amer. Soc. hort. Sci., 1952, 59: 125-32, bibl. 13.

In a study started in 1942, 12 scion varieties were compared on each of 14 rootstocks and with vines grown on their own roots. With nearly all varieties one or more of the rootstocks gave better yields, vigour and longevity than did their own roots, but the varieties differed greatly in their response to particular rootstocks. Three stocks, *V. riparia* \times *V. berlandieri* No. 161-49, Cynthiana and Muscadine hybrid, gave good results in most cases. Three other stocks, Aramon \times Rupestris Ganzin

No. 1, *V. monticola* × *V. riparia* No. 18804 and *V. monticola* × *V. rupestris* and own-rooted vines generally gave poor results.

333. HARMON, F. N., AND SNYDER, E.
Comparative value of three rootstocks for seventeen vinifera grape varieties.
Proc. Amer. Soc. hort. Sci., 1952, 59: 147-9, bibl. 5.

The average yearly fruit and wood weights for the last five years of a 14-year test of 17 vinifera varieties grafted on 3 rootstocks show a wide range in the response of the different varieties to these rootstocks under Fresno conditions. Rupestris St. George, the leading rootstock in the Napa Valley of California [see *H.A.*, 20: 1398] was definitely inferior at Fresno. Dog Ridge and Solonis × Othello No. 1613 were both superior to Rupestris St. George as rootstocks for most varieties. Most varieties were more vigorous on Dog Ridge than on Solonis × Othello No. 1613, but the differences for fruit production were not distinct. [Author's conclusions.]—U.S. Dep. Agric., Fresno, Calif.

334. MANZONI, G.
Determinazione di alcune variabili su talee di vitigni portinnesi. Ricerca del peso specifico assoluto, del peso specifico relativo e della percentuale in volume di sostanza secca. (Determination of certain variables in cuttings of rootstock varieties of the vine. Research into absolute and relative specific weight and percentage of dry matter by volume.) [English summary 9 lines.]
Ann. Sper. agrar., 1952, 6: 1271-87, bibl. 2.

The investigation was designed to determine whether the variables in question could be used for the identification of the commoner rootstock varieties (a matter of considerable practical importance in the dormant season) but the result was negative.—Conegliano Res. Stat.

335. DE FREITAS, A. G. B.
Observações sobre a influência das castas de *V. vinifera* L. enxertadas na emissão radicular dos porta-enxertos. (Observations on the influence of the scion variety on the production of roots by the rootstock in vines.) [French summary 3½ pp.]
Agron. lusit., 1951, 13: 89-113, bibl. 14, illus.

Root production was compared in the grafted and ungrafted vine rootstocks *riparia* × *rupestris* 3306(C), 3309(C), and 101-14(Mt. et Gt.). The scion varieties used were Alicante Tinto, Diagalves, Tinta Miúda, Trincadeira and Vital. Examination of the root systems 3 years after planting showed that in all cases grafting caused a marked reduction in root growth, i.e. 53% for 101-14, 55% for 3309 and 58% for 3306. The differences in root growth and top growth between the 3 ungrafted stocks were not significant. When grafted, however, rootstock 3306 produced the greatest weight of top growth (taking an average of all the scion varieties used), there being no difference between the other 2 stocks. Of the scion varieties, Tinta Miúda was outstanding in vigour. As regards root production the stock 3309 produced on an average the smallest number of roots. Plants grafted with Trincadeira, Tinta Miúda and Vital usually produced more roots than those grafted with

Diagalves or Alicante Tinto. Observations on the various stock/scion combinations showed that root production of 101-14 was stimulated by the scion Trincadeira, that of 3306 was reduced by the scion Diagalves, and that of 3309 was stimulated by Vital but reduced by Alicante Tinto. Differences in top growth did not account for differences in root growth. It is considered that the restrictive effect of grafting on root growth is not due to reduced photosynthesis but to the discontinuity of the xylem at the union, which causes an obstruction to the basipetal transport of auxins. The importance of using grafted rootstocks in studies of rootstock adaptation to environmental conditions, such as drought, is stressed.—*Nat. Agron. Stat.*, Sacavém, Portugal.

336. KOLESNIK, L. V.
The various properties of vine buds used for grafting. [Russian.]
Doklady vsesojuz. Akad. sel'sk. Nauk, 1952, 17(4): 25-9, illus.

If fruiting wood is used for grafts it is shown to produce a better union than purely vegetative wood and also to have a stimulating effect on the rooting of bench grafted rootstocks.

337. TITARENKO, E. E.
The oblique method of planting vine grafts in the nursery. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 8, pp. 42-3, bibl. 2, illus.

Vine grafts planted at a 40-45° angle, up to a depth of 20-25 cm., rooted better than those planted vertically up to 35-40 cm. depth, as a result of the roots developing in the upper, richer and warmer soil layer.

338. FAJNSTEIN, R. M.
A waste product for vineyard fertilization. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 6, pp. 40-1.

Waste "gumbrin" (black powder), a residue of clay obtained in Georgia and used in the purification of crude oil, stated to contain 40% organic matter, was found very effective for the improvement of the physical condition of heavy soils. The material added to fully fertilized (120 kg. N, 120 kg. P and 90 kg. K) vineyard soils at the rate of 10 and 20 t. per ha. improved yields by 7.1 and 19.2% respectively, increasing at the same time the sugar content of grapes and vigour of plants. Applied as a mulch it also proved beneficial.

339. HENDRICKSON, A. H., AND VEIHMEYER, F. J.
Irrigation experiments with grapes.
Bull. Calif. agric. Exp. Stat. 728, 1951, pp. 31, bibl. 9 [received 1952].

The grapes did not require irrigation until the moisture content of the soil in contact with the roots was reduced to the permanent wilting level and good practice is to irrigate only frequently enough to keep the soil moisture above this. Irrigation did not adversely affect the appearance, flavour, keeping quality, or drying ratio of the table and raisin varieties tested or the wine quality of the wine varieties if all fruit was allowed to mature, though the smaller berries from the dry plots gave a darker wine. In general, berries and yields were larger from the moist plots, but in some cases there was a slight delay in ripening as compared with the dry plots.

340. BUŠIN, P. M.

Vineyard irrigation in Uzbekistan. [Russian.]*Vinodelie i Vinogradarstvo*, 1952, No. 7, pp. 30-3.

Data presented show yield increases due to increasing applications of water, accompanied in some cases by a slight reduction in the sugar content of grapes. Recommendations are for 7 applications of water in summer, starting 5th-10th May at 1,000 m³ water per hectare on each occasion, and 3 winter applications at 1,000-1,400 m³ per ha.

341. WEAVER, R. J., AND WINKLER, A. J.

Increasing the size of Thompson Seedless grapes by means of 4-chlorophenoxyacetic acid, berry thinning and girdling.*Plant Physiol.*, 1952, 27: 626-30, bibl. 6, illus.

In order to discover a better method of obtaining large berries of Thompson Seedless grapes than the traditional one of girdling, tests were made to compare the effects of dip and spray applications of 4-chlorophenoxyacetic acid, girdling and berry thinning, alone and in combination. The results are tabulated for weight of clusters, weight of berries, % total soluble solids and % acid. The clusters treated with growth regulator developed larger berries, had thicker pedicels and were usually heavier than untreated clusters. Girdling, however, resulted in the development of even larger berries than did growth regulator treatment. 4-chlorophenoxyacetic acid had no effect on the foliage at any concentration used, but at 25 p.p.m. it injured a few of the clusters which were sprayed when very young. The pedicels of sprayed berries were more firmly attached than those of unsprayed berries, and clusters sprayed with growth regulator at 15 or 25 p.p.m. shattered less easily.—Univ. Calif.

342. SARTORI, G. A.

Ampelopatia da fitormoni. (The effect of plant hormones on vines.)*Riv. Vitic. Enol.*, 1952, 5: 319-26, bibl. 8, illus.

When small quantities of 2,4-D were accidentally applied, vines began to show the effect after 2-3 days. After a month they displayed the following symptoms: (1) various leaf abnormalities; (2) long and short (as well as normal) internodes; (3) tendrils on the branches with long internodes normally formed but highly developed; (4) inflorescences apparently normal but the buds at the distal end failed to open. Riesling was more affected than Merlot.

343. COUTINHO, M. C. P.

Aspectos anatómicos de queda da folha na *Vitis vinifera* L. (Anatomical aspects of leaf fall in *Vitis vinifera*.)*An. Inst. sup. Agron. Lisbon*, 1951, 18: 89-94, bibl. 15, illus [received 1952].

The separate processes of abscission of the leaf blade and the petiole of vine were studied.

344. MANZONI, L.

La maturazione del tralcio. (The maturation of the vine stem.)*Riv. Vitic. Enol.*, 1952, 5: 283-7, illus.

August is the critical month. Having consumed more than it produced during early development the vine

must thenceforward produce more than it consumes in order to build up its reserves, mature the fruit of the current year and ensure a good crop the following year. The processes of maturation which mark the passage from a passive to an active economy are briefly described in chronological order. Among factors which retard maturity and render it less complete are excessive vigour, lack of sunlight, defoliation, ill health, excessive production, low temperatures and too short a growing period. The density and chemical content of vine stems have not proved satisfactory criteria of the state of maturity. Most American rootstock species (especially *berlandieri* and *rupestris*) require fairly warm conditions and good siting.

345. GRILL, F.

Einige Möglichkeiten der Tresterverwertung. (Some possibilities of utilizing grape residues.) [English summary 4½ lines.]*Mitt. Klosterneuburg*, 1952, 2: 169-73.

Brandy, seed oil and manure are among the product of grape residues.

Nuts.

(See also 122d, 129, 130, 149, 1197, 3560.)

346. BRYDEN, J. D.

Cultivation of tree nuts in New South Wales.*Agric. Gaz. N.S.W.*, 1952, 63: 419-21, 430.

Short notes on the almond, walnut, Macadamia (Australian) nut, pecan and hazel nut.

347. MEARA, M. L.

The component acids of an English almond oil.*Chem. Ind. Lond.*, 1952, pp. 667-8, bibl. 8.

The kernel fat from a tree of *Prunus amygdalus* var. *dulcis* growing near Liverpool was found to differ greatly in composition from the almond oil normally obtained from warmer countries. In particular the linoleic acid content was more than double that recorded elsewhere. This, combined with an increase in saturated acids, made considerable reduction in the oleic acid content inevitable.

348. McCARTY, C. D., LESLEY, J. W., AND FROST, H. B.

Bitterness (benzaldehyde content) of kernels of almond-peach F₁ hybrids and their parents.*Proc. Amer. Soc. hort. Sci.*, 1952, 59: 254-8, bibl. 5, being *Pap. Calif. Citrus Exp. Stat.* 719.

Attempts are being made by backcrossing sweet almond × peach hybrids to produce almonds that blossom later, are self-fertile and contain kernels free of the bitter principle amygdalin found in the seeds of peach, apricot and bitter almond. The amount of bitterness in almond, peach and F₁ hybrids was determined by estimating the benzaldehyde produced by hydrolysis of amygdalin. Considerable variation was found among peach varieties, which suggests the possibility that a sweet-kernelled peach could be found by selection. The hybrids, though generally intermediate between their parents, were highly variable, and no conclusions could be drawn as regards dominance.

349. SCHAD, C., AND SOLIGNAT, G.
Biologie florale et méthodes d'amélioration
du châtaignier. (Floral biology and methods
of improving the sweet chestnut.)
C.R. Acad. Agric. Fr., 1952, 39: 350-2.

The floral biology and fertility of the chestnut are briefly discussed, and also the breeding of individuals resistant to ink disease and *Endothia* collar rot by crossing *Castanea crenata* and *C. mollissima* with *C. sativa* and back crossing the F_1 hybrids with the resistant parents.

350. URQUIJO LANDALUCE, P.
Multiplicación asexual de castaños. (Vegetative propagation of sweet chestnuts.)
An. Inst. nac. Invest. agron. Madrid, 1952, 1: 317-23, illus.

Trials carried out at the Estación de Fitopatología, La Coruña, on the vegetative propagation of disease resistant chestnut varieties are reported. Trials with soft- and hard-wood stem cuttings were completely unsuccessful; the cuttings callused but did not root even when treated with growth substances. Preliminary trials with root cuttings gave slightly more promising results. It was found that when the stem was ringed at soil level suckers would develop on the roots which could then be separated from the parent plant. A fair proportion of layers rooted but multiplication by this method was slow. The most promising method was grafting a resistant scion onto a shoot of any variety and then layering the shoot so as to induce scion rooting. Root grafting was not very successful but the method is considered to warrant further study.

351. BEIJERINCK, W.
De hazelnotenteelt. (Hazel nut culture.)
Meded. Tuinb. Voorlicht. Dienst 47, 1950, pp. 71, bibl. 117, illus., fl. 1.75 [received 1952].

Trials carried out since 1943 at the Biological Station, Wijster, have shown that the culture of hazel nuts in Holland is technically possible if suitable varieties are chosen and the plantations are properly managed. In this publication information is given on botany, varieties grown in Europe and the United States, propagation, planting, management, food value and uses of the nuts, and the value of hazels in forestry and ornamental plantings. Much of the information is taken from English and American work. A final section is devoted to an analysis of the economic possibilities of hazel nut culture in Holland, the conclusion being reached that the prospects are good provided that suitable arrangements are made for marketing. [For a shorter account, see *H.A.*, 22: 1300.]

352. NIZI, G.
Le varietà di nocciuolo. (Hazel nut varieties [in Cimino district, Lazio Province].)
Ital. agric., 1952, 89: 387-96, bibl. 7, illus.

A detailed description is given of the six important varieties of hazel nut cultivated in part of the Province of Lazio, Italy. In the order of their importance they are Gentile, Nocchione, Barettona, Rosa, Lunga and Imperiale di Trebisonda.

353. TRICAUD, P.
Le noyer dans le centre-ouest de la France.
(The walnut in west central France.)
Pomol. franç., 1952, 79: 97-103, illus.

The chief varieties are Marbot, Corne, Lalande, Nave, Grandjean, Grosjean and Carême. Propagation is by grafting at the collar or on the roots of seedlings. The common methods of grafting are listed. The chief rootstocks are *Juglans regia* and *J. nigra*. The latter is highly compatible with French varieties, gives them vigour and earliness and enables them to be grown on humid sites. Planting is at 15 × 15 m. The main stem is headed back at 3-3.5 m. and 3-5 framework branches are permitted to develop. Equilibrium and aeration are subsequently maintained by autumn pruning. Mature trees in full bearing require the following annual applications of fertilizers: 6 kg. superphosphate, 2 kg. sulphate of ammonia, 4 kg. K sulphate and 0.5 kg. Mn sulphate, all dug in in winter; and 2 kg. Na nitrate spread on the surface in spring. Organic manure (but not farmyard manure) should be applied every 4-5 years but N should not be overdone as it predisposes the tree to bacteriosis. A winter and summer schedule of fungicidal and insecticidal treatment is given.

354. FLOOR, J.
Het enten van noten. (Walnut grafting.)
[English summary 2½ lines.]
Meded. Inst. Vered. Tuinbouwgew. 24, 1951, pp. 11, illus.

An account is given of walnut grafting under glass, with details of potting-up one-year-old seedlings of *Juglans nigra* as rootstocks, selection of scion graftwood, and the technique of grafting, the best results being obtained with a modified German saddle graft method.

355. KOMA, S.
Growth of the walnut fruit and the change of chemical composition in its kernel. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1951, 20: 134-6, bibl. 4.

Weight and size of fruits and chemical composition of the kernels were determined at fortnightly intervals on varieties of *Juglans sieboldiana* and *J. regia* var. *orientalis*. The greatest increase in size occurred in the 6 weeks, and in weight in the 9-10 weeks, following flowering. In the kernel soluble non-nitrogenous substances, which were abundant in the early stages, decreased gradually as the fruits grew, whereas fats increased rapidly after the fruit reached its maximum weight, and protein increased gradually until the end of growth.

Noted.

356.
a ANON.
Fraisiers de grand mérite—nouveauautés sélectionnées. (Strawberries of merit—new selections.)
Courr. hort., 1952, 14: 432-4, illus.
Regina, Macherauchs Frühernte, and selected Senga varieties.
b ANON.
Plantación y poda de viñedos. (Planting and pruning vineyards.)
Bol. Estac. exp. Cinco Saltos, 1952, Vol. 4, Nos. 6-9, pp. 4, illus.
In the Río Negro valley, Argentina.

- c CHARLEY, V. L. S., MUMFORD, P., AND YUDKIN, J.
Effects of blackcurrant syrup in school-children and manual workers.
Reprint from *Lancet*, Feb. 2, 1952, p. 267.
Marked improvements in vitamin-C saturation demonstrated experimentally.
- d COSMO, I.
Contributi al miglioramento della vite. (Contributions to the improvement of the vine.)
Atti Accad. ital. Vite, 1950, 2(2): 186-205, illus. [received 1952].
Breeding and selection at Conegliano.
- e DALMASSO, G.
Nuove vedute sull'affinità d'innesto in viticoltura. (New views on affinity in grafting in viticulture.)
Atti Accad. ital. Vite, 1950, 2(2): 121-35 [received 1952].
- f DARROW, G. M., MORROW, E. B., AND SCOTT, D. H.
An evaluation of interspecific blueberry crosses.
Proc. Amer. Soc. hort. Sci., 1952, 59: 277-82, bibl. 6.
Involving 6 species.
- g EGUCHI, T., KATO, T., AND KOIDE, M.
Flower bud differentiation and development of grapes. [Japanese, with English summary $\frac{1}{3}$ p.]
J. hort. Ass. Japan, 1952, 21: 46-52, bibl. 17, illus.
- h ENGSTEDT, G.
Mannevik—en ny jordgubbssort. (Mannevik—a new strawberry variety.)
Fruktodlaren, 1952, No. 1, pp. 15-16, illus.
- i HEBERLEIN, H., AND WIBMER, H.
Rebenneuanlagen unter Mithilfe moderner Maschinen. (The establishment of new vineyards with the help of modern machines, [and the cost thereof].)
Schweiz. Z. Obst- u. Weinb., 1952, 61: 205-11, 275, illus.
- j MILLS, P. A.
Report on galacturonic acid in strawberry juice.
J. Ass. off. agric. Chem. Wash., 1952, 35: 520-4, bibl. 3. [See also *H.A.*, 22: 250g.]
- k MINISTRY OF AGRICULTURE, LONDON.
The loganberry.
Adv. Leaflet. Minist. Agric. Lond. 129, 1952, pp. 7, illus.
- l MORROW, E. B., AND DARROW, G. M.
Effects of limited inbreeding in strawberries.
Proc. Amer. Soc. hort. Sci., 1952, 59: 269-76, bibl. 10.
- m OLMO, H. P.
Breeding tetraploid grapes.
Proc. Amer. Soc. hort. Sci., 1952, 59: 285-90, bibl. 7.
- n PEYER, E.
Die geeigneten Traubensorten für die Herstellung von alkoholfreiem Traubensaft. (The best grape varieties for juice production.)
Schweiz. Z. Obst- u. Weinb., 1952, 61: 435-7.
- o DI PRIMA, S.
Contributo bio-statistico alla conoscenza delle varietà pugliesi di mandorlo. (Bio-statistical contribution to the knowledge of almond varieties in Apulia.) [English summary 4 lines.]
Ann. Sper. agrar., 1952, 6: 721-39, bibl. 32.
- p LE ROUX, M. S.
Planting distances for table grapes and the choice of a trellising system.
Decid. Fruit Gr., 1952, 2(7): 12-13, illus.
- q SCHUPPE, E.
Sortenbeschreibungen von Erdbeeren. (Variety descriptions of strawberries [grown in Germany]).
Dtsch. Baumsch., 1952, 6: 143-51, 203-8, 251-4, illus.
- r SLATE, G. L., AND KLEIN, L. G.
Black raspberry breeding.
Proc. Amer. Soc. hort. Sci., 1952, 59: 266-8, bibl. 1, being *J. Pap. N.Y. St. agric. Exp. Stat.* 872.
- s WILLIAMS, B. L., AND WENDER, S. H.
The isolation and identification of quercetin and isoquercitrin from grapes (*Vitis vinifera*).
J. Amer. chem. Soc., 1952, 74: 4372-3, bibl. 9.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(See also 121a, b, g, w, 547a, w, 1377, 1394.)

- 357.* MOORE, W. C.
International trade in plants and the need for healthy planting material.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 2.

Carriage of pests and parasites in or on plants and plant material moving in international traffic is the chief means by which diseases and pests reach new territories,

* See note, p. 3.

where they are often more destructive than in the old ones. Considerable interference with international trade in plants has resulted from plant protection regulations and quarantines imposed by importing countries to safeguard their crops from the introduction of foreign diseases and pests. The problem is reviewed and attention is drawn to recent conventions designed to facilitate co-operation in overcoming difficulties and to ensure the export and import of healthy planting material. The benefits and limitations of phytosanitary certificates are discussed, as also is the need for national plant disease surveys and further development of national health

certification schemes. Special emphasis is laid on the importance of close co-operation between government officials, plant pathologists, exporters and importers with a view to the reduction, simplification and interpretation of plant legislation in such a way that trade will be facilitated and adequate protection from new diseases and pests maintained. [Author's summary.]

358. MILLER, P. R., AND O'BRIEN, M.

Plant disease forecasting.

Bot. Rev., 1952, 18: 547-601, bibl. 203.

This review is concerned with the history and procedure of forecasting the probable seasonal incidence of various plant diseases as a practical method of lessening the seriousness of their effects. It "covers the scientific foundation for predictions, those services conducted as a practical aid to growers, and the investigations pertaining to forecasting that are now in progress". An account is given of the warning services in actual operation throughout the world for apple and pear scab, vine mildew, potato and tomato late blight, some grain crop diseases, and sugar beet diseases, together with a note on forecasting cranberry keeping quality. The research work reviewed includes that on blue mould of tobacco, on determining the necessity for seed treatment, on the spread of chestnut blight and on infection phenomena.

Disturbances of nutrition or unknown origin.

(See also 81-84, 121c, d, 285b, 547v.)

359. HAGIN, J.

The active lime content of soil as a factor in the development of chlorosis.

Bull. Res. Coun. Israel, 1952, 2: 138-46, bibl. 11.

Investigations are reported on soils from 3 regions in which both chlorotic and healthy plants were found of vine, plum or pear. There were no significant differences between chlorosis-producing and normal soils in mechanical or chemical composition or pH. A relationship existed, however, between the quantity of lime found within the colloidal fraction and the appearance of chlorosis. In the presence of a relative excess of colloidal lime the quantity of ferrous iron present decreased and the Ca : Mg ratio in the colloids increased. Analyses of leaves from trees on the same plots confirmed the results obtained from the soil analyses.

360. JAKOBSEN, S. T.

Om den S-formede udbyttekurves betydning for vurderingen af den kemiske planteanalyse. (On the significance of the S-shaped yield curve for the evaluation of plant-analytical data.) [English summary $\frac{1}{2}$ p.]

Horticultura, 1952, 6: 12-15, bibl. 5.

S- and U-shaped curves based on hypothetical figures are presented to illustrate the difficulty of diagnosing nutritional deficiencies from plant-analytical data. Suggestions are made on how to guard against fallacies. For a concrete example see *H.A.*, 22: 3550.

361. BEYERS, E.

Control of trace element deficiencies.

Decid. Fruit Gr., 1952, 2(2): 7-8.

Recommendations are made for the control of Zn and Mn deficiencies separately and together in the Western Province of S. Africa. *Zinc deficiency*: for deciduous fruit trees 8 lb. Zn sulphate, 5 lb. hydrated lime to 100 gal. water applied as soon as the trees have a fair

leaf cover after fruit set, repeated after a month if the symptoms have not disappeared; for grape vines paint wounds directly after pruning with a solution of 2 lb. Zn sulphate to 1 gal. water. *Mn deficiency*: 3 sprays of 2 lb. Mn sulphate in 100 gal. water at monthly intervals, the first as soon as the trees have a fair leaf cover after fruit set. *Zn and Mn deficiencies*: (1) 5 lb. Zn sulphate, 5 lb. Mn sulphate, 5 lb. hydrated lime in 100 gal. water; (2) a month later the same spray as (1) or (3); (3) a month later 2 lb. Mn sulphate in 100 gal. water.—W. Prov. Fruit Res. Stat.

362. WOODBRIDGE, C. G., CARNEY, A., AND McLARTY, H. R.

A boron deficiency in pear growing in soil having an adequate boron content.

Sci. Agric., 1952, 32: 440-2, bibl. 10, illus.

A disorder in pear trees, similar to that caused by a boron deficiency, is briefly described. Chemical analysis of affected tissues indicated a boron content that is normally associated with deficiency symptoms. Chemical analysis of the soil in which the trees were growing indicated a boron content that is adequate for tree development. A lowering of the soil moisture content in the fall and early spring is considered to be responsible for the occurrence of the deficiency. [Authors' summary.]

363. WILHELM, A. F.

Bormangel bei der Weinrebe *Vitis vinifera* L. (Boron deficiency in the grapevine.)

Phytopath. Z., 1952, 19: 129-59, bibl. 17, illus.

Serious deterioration in the growth of grapevines in parts of Germany are attributed to boron deficiency. The symptoms of the disorder are poor growth, weak shoots with short internodes, double buds, death of the growing point, increased growth of side shoots, failure of fruit to develop, and leaves with mosaic marking, pale marginal and interveinal parts, and necrosis. Certain varieties are more susceptible than others. The application of boron-containing manures is discussed in relation to soil types.

364. MOON, H. H., HARLEY, C. P., AND REGEIMBAL, L. O.

Early-season symptoms of magnesium deficiency in apple.

Proc. Amer. Soc. hort. Sci., 1952, 59: 61-4, bibl. 7, illus.

A rather unusual deficiency symptom was found on primary leaves of fruit-bearing spurs and water sprouts as early as 24 May, or 28 days following full bloom, on several varieties of apples. Leaf analysis indicated that the symptoms of scorch represented an early-season expression of magnesium depletion. Analyses of spur leaves, fruit flesh, and seeds, sampled 25 June, showed clear evidence that the scorching of leaves on fruiting spurs was the result of the translocation of magnesium to the seeds. [Authors' summary.]—Plant Ind. Stat., Beltsville, Md.

365. BULLOCK, R. M.

A study of some inorganic compounds and growth promoting chemicals in relation to fruit cracking of Bing cherries at maturity. *Proc. Amer. Soc. hort. Sci.*, 1952, 59: 243-53, bibl. 21, being *Sci. Pap. Wash. St. agric. Exp. Stats.* 997.

Mineral salts, whether injected in solution or inserted dry into the limbs of cherry trees in late April, had no significant effect on fruit cracking, size or composition at harvest time. When ripe fruits were immersed in various solutions, certain cations, notably Ca, Cu, Fe, Al, Th and U, reduced the cracking index, the trend indicating that the cracking index was reduced as the valence of the cation increased, so long as the anion was monovalent. Preharvest Al and Ca sprays, particularly the former, reduced the tendency to crack. Sprays of Na and NAA at 0.1-1.0 p.p.m. reduced cracking effectively when applied 30 to 35 days before harvest, but increased cracking markedly when applied 4 to 18 days before harvest. Temperature increased cracking throughout a range from 1° to 48° C. The tendency to crack increased to a maximum when the sugar content of the fruit reached 20% to 21%.

366. MCCORNACK, A. A., AND OTHERS.
A black tip condition on peach fruits in California.
Plant Dis. Repr., 1952, 36: 99-100, illus.

The symptoms of the disorder described consist of black, generally circular, sunken areas at the blossom ends, varying from slightly discoloured tips to areas $\frac{1}{2}$ in. in diameter, becoming hard and tending to separate from the healthy tissues. The cause is undetermined but the character of the lesions suggested chemical injury and it is suspected to be due to air pollution, the affected region lying within 4 to 12 miles of a steel plant. One grower appears to have reduced the amount of injury in his orchard by using overhead irrigation.

367. PUPILLO, M.
"Melanosi fisiologica" della vite. (Physiological melanose in the vine.) [English summary 11 lines.]
Ann. Sper. agrar., 1952, 6: 784-91, bibl. 2, illus.

A description is given of "physiological melanose", a leaf-spotting disease in *Rupestris* du Lot, which has been observed in parts of Italy and is thought to be due to an abnormally high transpiration rate associated with water disequilibrium. Its symptoms resemble those of "parasitic melanose" caused by *Septoria ampelina* and its etiology recalls that of "false melanose", caused by abnormal temperature conditions. Tiny brown spots appear, chiefly on the lower surface of the leaves, and sometimes coalesce and occupy a considerable area.

368. GALLAY, R., AND STAEHELIN, M.
Un jaunissement des vignes qui n'a rien de commun avec la chlorose calcaire. (A chlorosis of vines unconnected with lime-induced chlorosis.)
Rev. romande Agric. Vitic., 1952, 8: 49-51.

A vine chlorosis was observed on different soils in different parts of French Switzerland a few weeks after budburst in 1952. Symptoms were small leaves recurved upwards with necrosis on the margin and in bands localized between the main veins. Intensity of attack on individual vines in any particular vineyard was very variable and was correlated with yield in 1951. The cause was presumed to be exhaustion of reserves of assimilated material due to a heavy yield in 1951 following a season unfavourable to the building-up of supplies.

369. TELLIEZ, J.
L'asphyxie des pêchers dans le Sud-Ouest en 1951. (Asphyxiation of peach trees in south-west France in 1951.)
Bull. tech. Inf., 1952, No. 69, pp. 307-15, from abstr. in *Jardins Fr.*, 1952, 6: 194.

Severe losses were suffered in 1951 by peach trees planted on impermeable soil as a result of a cold, wet period. Planting on a slope, good drainage and improving the humus content of the soil can help to prevent asphyxiation of the roots, but the most practical measure is the use of suitable rootstocks; Black Damas and St. Julien can be used on impermeable soils, but peach stock is unsuitable.

Climatic and atmospheric factors.

(See also 23, 24, 28, 53, 54, 121o, 155, 156, 547k, u, 1377.)

370. BREUER, W.
Frostschäden im Obstbau. (Frost damage in the orchard.)
Ber. dtsh. Wetterdienst. U.S. Zone 32, 1952, pp. 74-7, illus.

Various types of winter damage to fruit trees are described and illustrated. A distinction is made between indirect injury by solar radiation, etc., and the killing of roots and above-ground parts by frost.

371. BRIERLEY, W. G., LANDON, R. H., AND STADTHERR, R. J.
The effect of daily alterations between 27 and 39 degrees F on retention or loss of cold resistance in the Latham raspberry.
Proc. Amer. Soc. hort. Sci., 1952, 59: 173-6, bibl. 7, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2673.

The exposure of canes of Latham red raspberry for 2 to 20 hrs. daily to a temperature of 27° F. did not develop a sufficient degree of cold resistance to protect the canes from subsequent exposure to -3° F. When canes were held for 20 hrs. at 27° F. and 4 hrs. at 39° F. each day for 2-3 days they withstood subsequent exposure to 21° F., but when kept at these alternating temperatures for 4 days or longer they were killed or injured when subsequently exposed to 21° F. or lower.

372. LOEWEL, E. L.
Das Frühjahr 1952 und die Frostschäden im Niederelbegebiet. (The spring of 1952 and frost injuries in the lower Elbe region.)
Mitt. ObstbVersuchsrings Jork, 1952, 7: 102-15, bibl. 4, illus.

An account of spring frost injuries to top and small fruit supported by 23 photographic illustrations. Meteorological and phenological data are also presented.

373. LOEWEL, E. L.
Fruchtschäden im niederelbischen Obstbaubaugebiet und deren Ursachen. (Fruit injuries in the fruitgrowing area of the lower Elbe and their causes.)
Mitt. ObstbVersuchsrings Jork, 1952, 7: 139-45, bibl. 3.

Most of the injuries to apple, pear and cherry fruits which are described and illustrated by 14 photographs

were due to late spring frosts in May 1952. Frost injuries to apple shoots and severe scab incidence following the frost are also recorded. Frost-damaged pears flowered a second time at the end of June.

374. DELBARD, G.

Les méfaits des gelées tardives sur la floraison des arbres fruitiers dans le Centre.
(The damage done by late frosts to fruit tree blossom in the central region of France.)
Jardins Fr., 1952, 6: 184-7, illus.

During early April 1952 frosts of -2 to -7° C. occurred in the central region of France. Apple varieties in which the flower buds were protected by a cluster of expanded leaves, such as Belle de Boskoop, suffered little blossom damage, whereas varieties such as Reinette du Canada, in which the flower buds were not protected by leaves, were seriously damaged. The development of the protected blossom, however, was retarded compared with that of the unprotected ones. With pears, the varieties in which the very young fruits are coloured, such as Beurré Clairgeau, Louise Bonne, Clapp's Favourite and Williams, appeared to be less susceptible to frost damage than other varieties. Cross pollination trials showed that it was the ovules, not the pollen, of Passe Crassane that were damaged. On Comice the pedicels appeared to be affected, and on Beurré Clairgeau and Louise Bonne the abscission of the petals was retarded. The apple and pear varieties under observation are listed according to the resistance of their flowers to frost damage.

375. KOBEL, F.

Frostschäden an Früchten der Zucalmaglio-Reinette. (Frost injuries to fruits of Zucalmaglio Reinette.)
Schweiz. Z. Obst- u. Weinb., 1952, 61: 385-6, illus.

Photographs illustrate four types of frost damage to apple fruits which occur when the ovary is injured after petal fall.

376. ATKINSON, J. D.

Frost damage to apricot blossoms and fruit.
N.Z. J. Sci. Tech., Sect. A, 1952, 34: 277-85, bibl. 6.

Blossom and small fruits of the apricot varieties Moorpark and Roxburgh Red were frozen artificially during four seasons to determine the point at which damage occurred. Although there were wide variations between replications it was demonstrated that flowers of both varieties became more susceptible to frost as they developed. In general, amount of damage increased with increase in time of exposure to a given temperature. Measurements of temperature inside flowers on the tree during a frost showed that there was little variation from air temperature. Percentage damage for a given temperature was much greater for wet blossom than for dry. There was some evidence to suggest that flowers borne on wood three or more years old were more susceptible to frost than flowers carried on one-year-old wood. When flowers or fruit were held for periods of an hour or more at a temperature known to cause damage and then cooled quickly a further 1° F., percentage damage was increased, but only to a moderate degree. Lists of critical temperatures for various stages of growth are given. By lighting orchard heaters at the times indicated, a full crop was secured

from a block of 60 trees for two successive seasons. [Author's summary.]

377. WEISE, R.

Mikroklimatische Geländestudien an der Laubverfärbung der Reben im Herbst 1951 und ihre Folgerungen für den fränkischen Weinbau. (Microclimatic studies on the autumn colouring of vines and the conclusions to be drawn therefrom for the viticulture of Franconia, Germany.)
Ber. dtsh. Wetterdienst U.S. Zone 38, 1952, pp. 237-40.

An early frost on 8 October, 1951, induced premature autumn colouring in some exposed vineyards of Lower Franconia, which allowed immediate recognition of the danger areas. Recommendations are made on the training of vines in affected localities and on frost protection by hedges and walls.

378. DOSTÁLEK, J.

Studie ovzdnosti třešňových a višňových květů vůči zmrzáni. (Study of the resistance of sweet and sour cherry flowers to frost.)
Sborn. čes. Akad. Zeměd., 1952, 25: 117-20, bibl. 10.

Late spring frosts in 1951 damaged the flowers of all 67 cherry varieties grown as dwarf trees on *Prunus mahaleb* at the Pruhonic Horticultural Research Station. Observations have shown that the flowers of sour cherries are more frost resistant than those of sweet cherries, though some of the sweet cherry varieties were relatively hardy. Flowers on the upper part of the dwarf trees sustained less damage than those on the lower part, indicating that the type of tree chosen can partially influence the effects of late spring frosts. Undeveloped flowers suffered less than those further developed on the same tree. It is suggested that when selecting cherry varieties more attention should be paid to the frost resistance of flowers.

379. KONDO, I. N.

The so called "sweating out" of vine buds in Uzbekistan. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 9, pp. 39-44, bibl. 3.

In Uzbekistan in some years a high percentage of vine buds get killed under their winter covering. The causes, including wrong type of cover, variable, particularly damp and mild weather, and late removal of cover, are discussed. A soil layer 20-30 cm. deep (depending on the district), better reed-grass cover, and rational timing of its removal are recommended for the prevention of these losses.

380. LESSMANN, H.

Frostwarnung und Frostschutz. (Frost warning and frost protection.)
Ber. dtsh. Wetterdienst U.S. Zone 32, 1952, p. 84.

Two methods of forecasting frosts are discussed: (1) According to the temperature-vapour pressure diagram and (2) according to the Kammermann rule which requires only a wet bulb thermometer. The forecasts based on this simple instrument and on some tables drawn up from earlier temperature records have reached a satisfactory degree of accuracy.—Bioklima Inst. Baldenweiger Hof bei Freiburg i. Br.

381.* ROGERS, W. S.

Some aspects of spring frost damage to fruit and its control.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 20.

The author briefly surveys the general problem of frost damage to fruit and then describes certain aspects of relevant East Malling work. The value of tissue temperature measurements, using fine thermocouples, is noted. Factors affecting resistance are discussed. The best remedy still lies in avoidance. Cultural practice can in some measure achieve this. A description is given of a method of frost protection by continuous water sprinkling.

382. McCrory, S. A., AND LAZARUK, W.

Mulching strawberry plants for winter protection.*Bull. S. Dak. agric. Exp. Stat.* 420, 1952, pp. 18, illus.

This bulletin deals first with the results of trials on the date and depth of winter mulching for strawberries in South Dakota and then with the physiological response of the plants to weather conditions. As there is no variety hardy enough to survive the severe winters without some loss, mulching is desirable, but it has hitherto given unreliable protection. The trials showed that marsh hay or straw are satisfactory mulching materials, and that snow cover alone is not dependable. The mulch should not exceed 2 in. in depth, as a heavier covering is conducive to ice formation in the mulch. The time of mulching is of the greatest importance but must be determined by the weather conditions and not by the calendar. The mulch should be applied after the plants have developed a certain degree of winter hardiness by exposure to cold, sunny weather which encourages accumulation of carbohydrates. A few days of warm weather may cause the plants to lose their hardiness. Varieties differ in their ability to develop hardiness. Premier, for instance, which benefits from an early mulch, responds rapidly to cool weather.

383. AICHELE, H.

Untersuchungen über die Frostschutzwirkung eines Kalkanstrichs an Obstbäumen. (Whitewashing fruit trees for frost protection.)*Ber. dtsh. Wetterdienst. U.S. Zone 32*, 1952, pp. 70-3, bibl. 14.

A 20 cm.-wide strip on a 60-year-old pear tree in the Black Forest (altitude 800 m.) was whitewashed at a trunk height of 4-5 feet and cambium temperatures on all sides of the tree were read within the treated strip and outside it. Whitewashing had the effect of largely smoothing out the peaks in the daily temperature curves, especially on the south but also on the west side. For instance, for the months January to March the mean temperature differences between the north and south sides, and between maxima and minima on the south side, were reduced to 55 and 59% respectively of those recorded for the untreated parts of the trunk. Cracking of the bark is a common type of winter injury in Germany. As it usually occurs on the south side of the tree it is likely that the damage is due to abrupt changes of temperature on sunny days. The data presented suggest that partial whitewashing, viz. the south

and west sides of the trunk, may afford some protection against this trouble.

384. WEGER, N.

Brauchbarkeit von Lufttrübungsmitteln zur Frostabwehr. (The phytotoxicity of mists generated for frost protection.)*Ber. dtsh. Wetterdienst. U.S. Zone 32*, 1952, p. 83.

Of four chemicals tested indoors only aluminium chloride did not cause any injury to plants provided it was generated at a low concentration. The three phytotoxic compounds were (1) of unknown composition, (2) a zinc containing smoke, and (3) ammonium chloride.—Geisenheim.

385. FAIVRE, M.

La lutte contre les gelées de printemps en culture fruitière. (Spring frost control in fruit growing.)*Rev. hort. Paris*, 1952, 124: 735-8, bibl. 3, illus.

The efficiency and costs of 3 types of apparatus were studied in the Rhône Department, France, in 1951. The Chouvel system of warming the air by Gelivore fuel-oil heaters was efficacious at 200 heaters per ha. provided there was not too much wind, and was the cheapest. The Parrenin system in which heat, smoke and carbon dioxide are generated was the next in order of cost at 12 tanks per ha., but 20-25 per ha. were considered necessary to ensure protection. The American Frostguard system of direct warming by infra-red rays was much the most expensive and some burning of fruit occurred within 10 m. of each apparatus; 7-8 Frostguards per ha. were found necessary.

386. ANON.

Selbsttätiger Frostschutz für den Obstbau am Bodensee. (Automatic frost protection for orchards on Lake Constance.)*Obst u. Gemüse, Markt-u. Preisberichte*, 1952, No. 43.

The agrometeorological station at Friedrichshafen, Lake Constance, introduced a small instrument for automatic protection against blossom frost. The finger on the dial of a contact thermometer, which is connected with a torch battery, closes the circuit at the desired temperature and thereby explodes cartridges in the orchard. It is intended to connect the thermometer also with a small transmitter which would report temperature readings by Morse code. O.J.

387. BROOKS, F. A., RHOADES, D. G., LEONARD, A. S.

Wind machines.*Calif. Agric.*, 1952, 6(8): 7-8, illus.

Detailed comparisons made at Riverside between fan machines of 15 and 90 brake horsepower are summarized.

388. BARTON, R. R.

Frozen apples make satisfactory cider.*Ohio Farm and Home Res.*, 1951, 36: 90-1, illus.

Tests were carried out in Ohio to determine whether Stayman Winesap apples that had been frozen on the tree or on the ground in November 1951 could be used for cider making. The fruit was divided into 3 lots,

* See note, p. 3.

according to the severity of the freezing damage and the cider produced was compared with that from unfrozen apples. Little difference was found in the taste of the cider from frozen and unfrozen samples, or in the soluble solids content, but there was a slight decrease in acid content in the frozen fruit cider. The yield of cider obtained from a given weight of fruit was higher from the frozen fruit. The turbidity was greater but this could be overcome by clarification after pressing. It is pointed out that frozen fruit must be handled rapidly if it is to be made into cider, in order to prevent spoilage.

389. EIDG. VOLKSWIRTSCHAFTSDEPARTEMENT, BERN.

Grossversuch zur Bekämpfung des Hagels auf der Magadinoebene. Tätigkeitsbericht Nr. 3, 1950, 1951, und Nr. 1, 1951, 1952. (Third and fourth annual report of large-scale trials on the prevention of hail storms in the Magadino plain [Switzerland] for 1950 and 1951, pp. 98 and 54 respectively; numerous maps [received 1952].

For a brief account of this scheme see *H.A.*, 19: 1911. The annual reports for 1950 and 1951 do not go beyond the presentation and discussion of meteorological and certain other data as the results will not be evaluated before the completion of a 5-year experimental period. Tobacco and vines are the chief crops to be protected.

390. F[RITZSCHE], R.
Sonnenbrandschäden an Obstbäumen. (Sunburn injury to fruit.)
Schweiz. Z. Obst- u. Weinb., 1952, 61: 279-80, illus.

In the summer of 1952 apple and pear leaves showed necrotic spots and large, brown, circular spots appeared on many fruits. As the blemishes occurred also on unsprayed trees they are thought to be primarily due to the intense radiation of the sun. Since applications of sulphur and lead arsenate aggravate the trouble, growers are advised to spray only in the early morning or in the evening of a hot, clear summer day. The water used must not be too cold.

- 391.* BLACK, M. W.
The problem of prolonged rest in deciduous fruit trees.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 8, bibl. 35.

Investigations on the causes of the shedding of flower buds have revealed that with the peach this phenomenon is the direct result of the dying of the flowers or floral organs within the bud. This is caused by the cumulative effects of high temperatures during a prolonged rest. The flowers that do emerge are frequently underdeveloped, dwarfed pistils especially being evident and many of the flowers are incapable of setting. In view of the above, it is suggested that in addition to a chilling criterium, a heat criterium such as maximum temperatures or hours of temperature above, e.g. 50° F. or 55° F. be used in studies of "prolonged rest". The delay as well as the unevenness in the development of both flower and leaf buds are the direct result of lack of chilling temperatures at about 45° F. The combination of delay and irregularity results in poor setting and inferior fruit quality, especially in regard to post-harvesting life;

* See note, p. 3.

other effects are deficiency in leaf surface and unbalanced growth affecting the production of fruiting wood. The permanent solution of the problem lies in the acquisition of more adaptable varieties by breeding and a systematic selection of chance seedlings and branch mutations. Much progress has in recent years been made in these directions in South Africa. The possibilities of widening the range of adaptation of varieties have been opened by the success of Dinitro-cresol-petroleum oil sprays as a rest breaking treatment for apples, pears and plums. The results have been less successful with peaches and apricots; however, further promising lines of research are being followed. Rest breaking treatments appear to be most effective near their lethal points. However, little is known regarding the biochemical aspects of "prolonged rest" and more fundamental work is needed. [Author's summary.]

392. BROWN, D. S.

Climate in relation to deciduous fruit production in California. IV. Effect of the mild winter of 1950-51 on deciduous fruits in northern California.

Proc. Amer. Soc. hort. Sci., 1952, 59: 111-18, bibl. 2.

The mild, wet winter of 1950-51 in northern California was characterized by above normal average and minimum temperatures, especially in October, November, December. Maximum temperatures were average or below normal as the result mainly of cloud or fog. The hours in each month with temperatures below 45° F. are tabulated. Observations are presented on the effects of insufficient chilling on flower bud drop in varieties of almond, apricot, peach, nectarine, plum, apple, pear, cherry and walnut. Except for the Tilton apricot and certain peaches, bud failure was not severe enough to result in serious crop reductions. Only with Bartlett pears and some sweet cherries was the blossoming period unusually prolonged and only with the walnut Franquette was delayed foliation pronounced. It would appear that the effects of the mild winter were mitigated by the low maximum temperatures and nearly normal amounts of cold weather in January and February.

393. CICCARONE, A.

Nota fitopatologica. V. Una "necrosi apicale" delle mele. (Phytopathological notes. V. An apical necrosis in the apple.) [English summary 4 lines.]

Ann. Sper. agrar., 1952, 6: 1073-6, bibl. 6, illus.

A short description is given of an apical necrosis in the apple which has been observed in orchards in hilly parts of Italy and is believed to be due to drought and excessively high temperatures.—*Plant Path. Stat.*, Rome.

394. SAITO, Y.

An investigation into the causes of the poor apple harvest in Aomori in 1951. [Japanese, with English summary 2 pp.]

Ser. Apple Aomori prefect. Govt. 19, 1952, pp. 110.

A close correlation was found to exist between (1) the low 1951 and the high 1950 yield; and (2) the temperatures in the first half of July (the period prior to flower bud formation) and the yield of the following year, high temperatures causing a low yield and *vice versa*. It was

concluded that the poor harvest of 1951 was due 60% to over-production in 1950 and 40% to climatic and other causes.

395. RECKENDORFER, P.

Ein Beitrag zur Mikrochemie des Rauchschadens durch Fluor. Die Wanderung des Fluors im pflanzlichen Gewebe. I. Teil: Die unsichtbaren Schäden. (A contribution to the microchemistry of fume injury by fluorine. The translocation of fluorine in the plant tissue. I. Invisible injuries.) [English summary 4 lines.]

PflSch. Ber., 1952, 9: 33-55, bibl. 16.

In his analyses of cherry, pear and lilac leaves collected in an area of atmospheric pollution the author found that invisible (chronic) fluorine injury is associated with a sufficient supply of calcium ions. If fluorine fails to be inactivated by calcium it forms organic compounds which are toxic to chlorophyll and cause necrotic spots. A simplified microanalytical method is described by which the share of inorganic and organic (ether-soluble) fluorine compounds in the total fluorine content was determined. A plant should be considered to suffer from chronic fluorine injury if the cellular fluorine deposits exceed 10^{-6} – 10^{-5} γ F and the term chronic should cover the whole range of F concentrations from the lower threshold value to the appearance of visible symptoms in the acute stage.

396. WENT, F. W.

Distribution of plant injury due to organic air pollutants.

Tijdschr. PZiekt., 1952, 58: 253-4.

The factors which combine to produce smog damage, i.e. damage caused by the reaction products of petrol vapour and ozone in the air, and the places where this has been recorded are briefly reviewed.

Viruses.

(See also 318, 547d.)

397.* VAN SLOGTEREN, E.

The serological diagnosis of plant diseases caused by viruses.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 5, bibl. 5.

Serological diagnosis is of great importance in the identification and classification of plant-viruses. It can reduce the time needed for a diagnosis from days, weeks or even a year to a few minutes or hours. The diagnosis is objective and independent of the symptoms of the plant, moreover the virus can be determined when present among symptomless carriers. Particularly in vegetatively propagated crops the removal of suspected plants at an early date is made possible. The method has been very helpful in maintaining sound hygiene in flower bulbs.

398.* HARRIS, R. V.

The maintenance of healthy fruit clones.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 12.

1. Virus diseases are a principal cause of the decline of fruit planting-stock under vegetative propagation, and this communication proposes a system, in three stages,

* See note, p. 3.

for maintaining clones with minimal infection by these diseases. 2. Recent research indicates that freedom from visual symptoms in the field provides no ultimate criterion of freedom from the noxious viruses. 3. Selection of healthy stock by eye should therefore be supplemented by direct determination of virus-status by test transmissions to indicator varieties and species by means of budding or grafting and by animal vectors. 4. Mother-plants thus selected constitute a sound basis for subsequent field propagation in bulk for the fruit-grower; to this end they are preserved and maintained under vector-proof conditions (Stage 1). At the same time the particular reactions of the new varieties to the relevant viruses and virus associations are determined. 5. Stage 2 consists in (a) multiplying annually, or at longer regular intervals, these tested mother-plants, under adequately protected conditions, sufficiently to plant the primary field-propagating beds, and (b) thus field propagating such nuclear or foundation stock, on nursery sites stringently selected and controlled to minimize the risk of virus infection, in numbers adequate to meet the needs of large-scale nurserymen and grower-propagators. 6. Stage 3 includes the production, under conditions defined by the certifying authority, of a limited number of certifiable harvests of planting-stock. Such propagating sites are refurbished at regular intervals, depending on the rate of virus re-infiltration of the particular crop, from the current issue of foundation stock produced in Stage 2. 7. The importance of adapting such a system to ensure the early assimilation of new seedling varieties of promise in the course of introduction is discussed. [Author's summary.]

399. POSNETTE, A. F., AND HARRIS, R. V.

Virus diseases of fruit crops.

Nature, 1952, 170: 181-2.

The article is a summary of papers on virus diseases of strawberry and tree fruits read by the authors on "Members Day" at East Malling Research Station in July 1952. Results hitherto obtained and the work in progress are surveyed with a brief discussion of the problems involved.

400. BÖMEKE, H.

Über Virus- und virusverdächtige Krankheiten im niederelbischen Obstanbaugebiet. (On virus diseases and diseases suggestive of virus in the fruitgrowing area of the lower Elbe.)

Mitt. ObstVersuchsrings Jork, 1952, 7: 126-39, bibl. 6.

Cherries: Eckelrader virus disease; ring-spot; mosaic; shot-hole; white-spot (not yet identified as a virus); yellow-spot (graft-transmissible; virus or mutation?). Plums: Ring-pox. Apples: Jonathan mosaic, Proliferation virus; Gravenstein branch virus. Pears: stony pit. Raspberries: mosaic. The symptoms are described and illustrated by 24 photographs.

401. NIKOLIĆ, V.

Nove viroze koštičavog voća u FNRJ. (New virus diseases of stone fruits in Yugoslavia.) [English summary 10 lines.]

Zashit. Bilja, Belgrade, 1951, No. 3, pp. 63-70, bibl. 9, illus.

In addition to mosaic and plum-pox on plums described earlier, the isolated incidence of mosaic is reported on

apricots, peaches and cherries. For the control of the vector of the disease, *Anuraphis padi*, winter applications of an oil emulsion or carbolineum supplemented by summer treatment with a nicotine preparation are recommended.

402. DÄHN, G.

Vergilbungs-, Flecken- und Dürreerscheinungen an den Blättern von Obstgehölzen. (Yellowing, spots and necrosis in the leaves of fruit trees.)
Dtsch. Baumsch., 1952, 4: 314-16, illus.

The author made a photographic study of certain leaf symptoms appearing on apples and pears in Western Germany. The foliage of both fruit varieties showed yellowing, mosaic and necrotic areas, while a willow-type of leaf occurred only in pears. Apple trees exhibiting these symptoms did not bear any fruit, but the vegetative growth of both apples and pears and the fertility of pears were not affected. In the author's view nutritional disturbances and fungal or bacterial pathogens may be ruled out as causes of the trouble. The disease is stated to be sap-transmissible but experiments proving this hypothesis are not reported.

403. KRISTENSEN, H. R.

Bukkelaebler—en ny virussygdom? (Crinkled apples—a new virus disease?)
Erhvervsfrugtavl., 1952, 18: 322-3, illus.

Deformation of apple fruits of the false sting (Canada) or green crinkle (New Zealand) type has recently become more common in Denmark. The symptoms are briefly described and illustrated.

404. RIEUF, P.

Au sujet de la maladie "du Bulida". (The "Bulida" disease [of apricots in Morocco].)
Fruits d'Outre Mer, 1952, 7: 128, illus.

First reported in Morocco in 1935 the disease affects the fruit only (in all parts of the tree). It manifests itself at maturation under widely differing climatic and soil conditions, and appears to be caused by a physiological disturbance (perhaps due to nutrient deficiency at maturation) or a virus. The first symptom is a short wrinkle which develops into a sunken, generally greenish or greyish lesion covering from a few sq. cm. to half the fruit. Below this the tissues die and finally pockets of gum develop and burst.

405.* WILLISON, R. S.

Some observations on virus diseases of the cherry.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6.

The response of cherries to virus infection varies in type, periodicity and severity of symptom expression, according to the causal virus and, to a lesser extent, the host variety. Many stone-fruit viruses induce characteristic symptoms on leaf, fruit or shoot, but some cause latent infections that are virtually symptomless, except in the early stages, when "shock symptoms" may or may not occur. Some are transmitted through the seed. A few disorders, such as crinkle and deep suture, that affect productivity and have virus-like symptoms, are not transmissible by the usual means. Differential hosts of different cultivated species of *Prunus* can be used for the comparison and tentative identification of viruses

from different sources and for the resolution of complexes, the components of which may not be readily distinguishable by their effect on a single host. Cross-protection tests indicate that multiple infections may occur even with related strains and that the symptom expression of a combination of viruses may differ from that of either virus alone. Whether or not apparently healthy trees are carriers of masked viruses can be determined by grafting to sensitive, healthy indicator hosts. The detection of virus-free sources of scions and rootstocks is a prerequisite for the establishment of the foundation stocks and certification schemes needed for the production of healthy nursery stock. Roguing in established orchards can be restricted to badly diseased or unproductive trees. Top-working of any sort should only be undertaken with due regard to the virus problem. [Author's summary.]—St. Catharines, Ont.

406. MILBRATH, J. A.

The mora virus disease of sweet cherry.
Phytopathology, 1952, 42: 347-8, illus., being
Tech. Pap. Ore. agric. Exp. Stat. 723.

A disease of Napoleon (Royal Ann) sweet cherry trees in Oregon, for which the common name "mora virus disease" [Latin "morari" to delay] is suggested, causes the ripening of the fruit to be delayed by about six weeks. Other symptoms are abnormally shaped fruit, retarded growth and rolled leaves. The disease has been transmitted by grafting. It appears to be potentially serious on sweet cherry but is still of limited distribution.

407. MILBRATH, J. A.

The prevalence of ring spot virus in a latent condition in cherries.
Plant Dis. Repr., 1952, 36: 137-9, bibl. 3.

In searching for virus-free trees to be used as mother scion trees for nursery propagation stock, more than 2,000 cherry trees were examined for visible virus, and 572 of those which showed no evidence of virus were indexed for the latent types of ring spot virus. Among the trees examined were specimens originating not only in north and south America but also in countries in Europe, Asia and Australia. The results indicate worldwide distribution of the ring spot virus, and show that many of the varieties were virus-free when imported. The studies show the importance of using virus-free rootstocks when developing new varieties.

408. DUMAS, J.

Une forme de dépérissement du cerisier d'origine inconnue, observée dans la région Lyonnaise. (A form of die-back in cherries, of unknown origin, observed near Lyons.)
C.R. Acad. Agric. Fr., 1952, 39: 411-15.

The symptoms of a disease of cherry trees (particularly Bigarreus) observed in France are discoloration of the foliage, weak growth, small fruit and eventually death. The cause is unknown and the possibilities of its being either a deficiency disorder or a virus disease are discussed.

409. GOMDÄNICH, G.

Le "macchie rosse" del pesco. (The "red spot" disease of peach leaves.) [English summary 10 lines.]
Ann. Sper. agrar., 1952, 6: 1267-70, bibl. 1, illus.

Cases of a mosaic leaf disease of the peach, previously

* See note, p. 3.

recorded only in Bulgaria, were found among one-year-old peach seedlings near Bologna in 1950. Scattered subcircular patches of chlorosis up to 1 cm. in diameter appeared on the blades of leaves in all parts of the plants early in summer and later became reddish-purple and developed necrosis at their centres and edges. Infected leaves fell early, especially those at the top of the plant. Another apparently totally unconnected condition occurred on the lower, older leaves of the same plants, often on the same branches. It was in the form of irregular white lines, sometimes forming rings. Grafting experiments to test transmissibility were undertaken.

410. THUNG, T. H.

Waarnemingen omtrent de dwergziekte bij framboos en wilde braam II.* (Observations on the *Rubus* stunt disease in raspberries and wild blackberries II.)

Tijdschr. PLZiekt., 1952, 58: 255-9, bibl. 1.

With a view to studying the effect of heat treatments on *Rubus* virus stunt, small pieces of roots with shoots attached were taken from diseased raspberry plants and given various heat treatments in January 1952. They were then planted in sand in the greenhouse and transplanted in the field when the plants had developed sufficiently. In one series of treatments diseased shoots were kept in petri dishes covered inside with moist filter paper in an incubator at 46° C. for varying periods up to 3½ hr. Treatment for 2½ hr. or less stimulated growth of shoots, but longer treatment was harmful. Shoots treated for 1½ hr. or longer produced plants which were still healthy in October. In another series of treatments diseased shoots were immersed in water at 45° C. for varying periods up to 3 hr. Growth of these shoots was less than that of shoots in the first series treated for 2½ hr. or less, but all the plants which survived appeared to be still healthy in October. Shoots which had been immersed for periods of 5-60 min. in water at 50° C. showed similar results.—Inst. PLZiekt. Onderz., Wageningen.

411. MILLER, P. W.

Technique for indexing strawberries for viruses by grafting to *Fragaria vesca*. *Plant Dis. Repr.*, 1952, 36: 94-6, bibl. 7, illus.

Both the "tongue" graft and the approach graft have been used successfully for grafting together the runners of the donor (plant being indexed) and the receptor (indicator plant). The best receptor is the East Malling strain of *F. vesca*. For the best results both should be vigorous, growing actively and at a similar stage of development. The donor should be grafted at least twice, and double grafting is essential in indexing plants of varieties to be used as virus-free foundation stocks. Indexing of strawberries may be carried on practically the whole year if a greenhouse equipped with lights is used during the winter. Fairly warm temperatures (60° to 70° F.) should be maintained in the house and darkness should be interrupted by 3 hours of light (11 p.m. to 2 a.m.) in the late autumn and winter months.—Ore. St. Coll., Corvallis, Oregon.

412. SCOTT, D. H., AND OTHERS.

Virus as a hazard in strawberry breeding in eastern United States.

Plant Dis. Repr., 1952, 36: 89-91, bibl. 6.

* For abstract of Part I, see *H.A.*, 22: 307.

Methods of maintaining virus-free breeding stock are described. In 1948 the variety Marshall was used as an indicator plant, but since then an East Malling clone of *Fragaria vesca* has been used. It is stated that at present there is no known source of virus immunity in strawberries, although there appears to be virus tolerance in certain varieties. One clone of *F. virginiana* shows some resistance.

413. CAIN, J. C., AND BOYNTON, D.

Fertilization, pruning and a leaf mottle condition in relation to the behavior of Italian prunes in western New York.

Proc. Amer. Soc. hort. Sci. 1952, 59: 53-60, bibl. 9, being *J. Pap. N.Y. St. agric. Exp. Stat.* 891.

Excessive summer and pre-harvest fruit drops and a leaf mottle condition, not fully described here, are commonly found among Italian prunes in western New York. Observations indicate that the leaf mottle condition reduces fruit production primarily through decreased fruit set and increased fruit drop without having any marked effect on tree growth except in the most severe cases. Trees affected by the leaf mottle responded normally to pruning and to applications of N and K as regards growth, absorption of nutrients and fruit maturity, but gains in yield were small compared to losses associated with the leaf mottle. No correlations could be established between the leaf mottle condition and leaf analyses for N, P, K, Ca, Mg, Mn, Cu and Zn, though the last two were unusually high in all affected trees. Neither soil drainage nor pollination failure were directly responsible for the trouble.

Bacteria.

414. MINISTERIE VAN LANDBOUW, NETHERLANDS. Bacterieknobbels bij fruit-en boomkwekerijgewassen. (Bacterial canker of nursery trees and fruit plants.)

Vlugschr. PLZiekt. Dienst Wageningen 51, 1952, pp. 6, illus.

An advisory leaflet dealing with the symptoms, causal agents (*Bacterium tumefaciens*, *B. rhizogenes* and *B. savastanoi*), damage and control of bacterial canker in nurseries of fruit and ornamental plants. Direct control measures have so far not proved practicable, and preventive measures, such as avoiding wounds, not planting in wet soil and disinfecting planting material and soil with organic mercurials, must be relied on.

415. TAYLOR, H. S.

Identification and control of bacterial spot of stone fruit.

N.Z. J. Agric., 1952, 84: 377-8, bibl. 1, illus.

Black spot of stone fruit (*Xanthomonas pruni*) has increased considerably in New Zealand in recent years and has extended its host range to a score or more varieties of Japanese plum. English varieties are generally highly resistant, and on peach the disease is rare in New Zealand. Among the plums the popular varieties George Wilson, Doris, Black Doris, and Masterpiece are most seriously affected. The symptoms of the disease are outlined. For control the application of bordeaux mixture at 5:4:50, ½:1:50, and 1½:3:50, according to the stage of development of the trees, is recommended, the first application being at bud movement.

Fungi.

(See also 547j, m, n.)

416. POWELL, D.

The effect of early spring fungicides on
Botrytis cinerea.

Plant Dis. Repr., 1952, 36: 97-8.

Botrytis rot of strawberries in the U.S.A. is probably the main cause of loss of berries in the field and in transit, particularly during wet harvesting periods. For control ferbam and orthocide 406 at 2 lb. to 100 gal. show promise when applied twice, starting in the early bloom period.—Univ. Illinois, Urbana.

417. OSTERWALDER, A.

Von der Weissfäule der Trauben (Coître).
(*Coniothyrium diplodiella* on vine.)

Schweiz. Z. Obst- u. Weinb., 1952, 61:
414-16.

Hail damage in July or August, when the grapes have a sugar content of 0.1-0.5% and the temperature is 25-30° C., predisposes vines to *Coniothyrium diplodiella* infection. In Ticino training on a high trellis seems to protect the vines as the fungus attacks only leaves close to the soil. Moreover, the customary sod cover in that area hinders sporulation. Collection of diseased grapes and spraying with 0.5% neutral oxyquinoline sulphate are the control measures recommended.

418. GOVI, G.

Due specie di *Cylindrocarpon* isolate da
fruttiferi. (Two species of *Cylindrocarpon*
on fruit trees.) [English summary 6 lines.]

Ann. Sper. agrar., 1952, 6: 793-804, bibl. 21,
illus.

A description is given of 2 species of *Cylindrocarpon* reported in Italy for the first time. These are *C. radicola* which was isolated from the roots and stem of *Prunus myrobalana* and *C. obtusisporum* from the stem of peach. A bibliography of the genus is included.

419. HOCHAPFEL, H.

Die *Cylindrosporium*-Krankheit an Süß-
und Sauerkirschen in Europa und Nord-
amerika. (The *cylindrosporium* disease of
sweet and acid cherries in Europe and North
America.)

Phytopath. Z., 1952, 19: 389-402, bibl. 30,
illus.

Die *Cylindrosporium*-Krankheit an Süß-
und Sauerkirschen, ihre Verbreitung und
Bekämpfung. (The *cylindrosporium* disease,
its spread and control.)

NachrBl. dtsh. PflSchDienst., Braunschweig,
1952, 4: 97-100, bibl. 11, illus.

In 1951, a *Cylindrosporium* leaf disease was notified in Germany on nursery seedlings of acid and sweet cherries and also on wildings. It had previously been recorded from France, Switzerland and Denmark. The symptoms were similar to those described for the leaf spot disease of cherries in North America caused by *Cylindrosporium* (*Higginsia*) *hiemalis*. The biology and control of the diseases as found in America and in Europe are discussed.—Institut für Obstbau, Heidelberg.

420. PUPILLO, M., AND CANOVA, A.

Contributo alla conoscenza del "mal dello
stacco" dei noccioli in Sicilia. (Contribution
to the knowledge of *Cytospora corylicola* in
hazel trees in Sicily.) [English summary
¾ p.]

Ann. Sper. agrar., 1952, 6: 895-906, illus.

This fungal disease, caused by *Cytospora corylicola*, is fairly widespread in Sicily and is one of the causes of the gradual decline in hazel cultivation. The first signs of attack are red patches on the branches and pink and orange conidial masses soon appear. At the infected point the bark and wood become darkened and necrotic. Finally, when necrosis has sufficiently weakened mechanical resistance, transverse and longitudinal cracks occur in the branches. General directions for prevention and control are given.—Bologna Plant Path. Lab. and Acireale Experimental Station.

421. KÖHLER, H.

Ein Beitrag zur Ätiologie und Bekämpfung
des Himbeerrutensterbens. (Etiology and
control of raspberry spur and cane blight.)

NachrBl. dtsh. PflSchDienst., Berlin, 1952,
6: 36-42, bibl. 5.

In central Germany, as elsewhere, spur and cane blight causes grievous losses in raspberries. Of the observations reported on the effect of environmental factors on the severity of the disease the following is the most remarkable: An entire raspberry plantation had completely succumbed to blight, with the exception of one area which was shaded by a garage at noon and in the early afternoon. Here the plants appeared healthy and continued to make vigorous growth and to yield well. On close inspection, it was found that the canes were covered with pycnidia of *Didymella applanata* and *Leptosphaeria coniothyrium*, but that the fungus mycelium was confined to the outer layers of the bark. Isolation of the fungi and inoculation of other canes proved these strains to have normal pathogenicity. The locality must therefore be presumed to have afforded the plants growing conditions under which they thrive and develop resistance. Measurements showed that, apart from the shade, the healthy area differed from the rest in greater uniformity of soil moisture. The significance of the latter factor is borne out by the survival of plants growing near a stream in a plantation which was otherwise destroyed by the disease. An examination of wild raspberries in a wood in Thüringen showed that in early summer the canes are covered with perithecia and in the autumn with pycnidia of *D. applanata* and throughout the year with pycnidia of *L. coniothyrium*. Again, visible symptoms of the infection were absent, the mycelium was confined to the outer layers and the isolated fungus strains proved very virulent. In the autumn of 1949 and in the late winter of 1950 an experimental planting was established with canes from three nurseries. Not one of the 2,000 canes assembled was found to be free from fruiting bodies of the fungi. A comparison of various treatments, such as soil cover (artificial manure containing a high proportion of rotted straw) and irrigation, showed that only mulching provided uniform soil moisture and prevented the plants from being affected by the disease. The untreated controls were either killed or seriously affected as the mycelium had already reached the roots

With mulched plants the incubation period was longer and the mycelium did not penetrate into the inner tissues of the cane. Spraying with bordeaux and spreader also controlled the fungi but not so effectively as mulching. Many of these experiments were carried out with susceptible variety Preussen. The production of toxins with a wilting action by *D. applanata* and *L. coniothyrium* was also demonstrated.—Aschersleben Branch of the Biologische Zentralanst.

422. PERIĆ, M. M.

Didymella applanata—the cause of drying of raspberry branches and stems—a raspberry disease new to Yugoslavia. [Serbian, French summary 6 lines.]

Zasht. Bilja, Belgrade, 1951, No. 8, pp. 18-21, bibl. 12, illus. [received 1952].

Didymella applanata was reported for the first time on raspberries in Yugoslavia in 1949. In 3 different districts of Serbia over 60% of the canes were observed to be infected in 1949-51, suggesting that the disease is not of recent introduction. For control the destruction of affected plants is considered most effective, though a spray programme consisting of one winter application of 2% bordeaux mixture or 1% copper oxychloride plus spreader, and one May or June treatment with 1% bordeaux was also found satisfactory.

423. WINTER, H. F.

Lime sulfur and ferbam sprays give control of raspberry anthracnose.

Ohio Farm and Home Res., 1951, 36: 83, 92-3, illus.

The traditional single, delayed dormant spray of lime sulphur has frequently failed to give satisfactory control of raspberry anthracnose [*Elsinoe rubi*], and later sprays of lime sulphur or bordeaux have caused serious foliage injury. Recent experiments in Ohio and elsewhere have shown that excellent control can be obtained by a delayed dormant lime sulphur spray followed by a pre-blossom and post-blossom ferbam spray (2 lb. per 100 gal.). Other new materials have also given good control but require further testing. [See also *H.A.*, 22: 2358.]

424. SCHAD, C., AND OTHERS.

Le problème du châtaignier en France. (Problems of chestnut culture in France.)

Bull. tech. Inf., 1952, No. 70, pp. 385-97, from abstr. in *Jardins Fr.*, 1952, 6: 223.

The problem of ink disease (caused by *Phytophthora cinnamomi* and *P. cambivora*) has not been overcome in France by the use of the resistant species *Castanea crenata* and *C. mollissima* as these species are not well adapted to the climate. At the Station d'Amélioration de Châtaigniers de Brive, Corrèze, an extensive collection of vegetatively propagated clones and hybrids is being tested for resistance. Bark canker, caused by *Endothia* sp., is not yet a problem in France, but resistant varieties are being sought as a precautionary measure. Some varieties resistant to ink disease have also been found resistant to bark canker.

425. KRSTIĆ, M.

Endothia parasitica in Yugoslavia. [Serbian.]

Zasht. Bilja, Belgrade, 1950, No. 2, pp. 113-16, bibl. 6 [received 1952].

A note on chestnut bark canker, *E. parasitica*, observed

for the first time in Yugoslavia in the Panovec forest near Nova Gorica, with a review of the literature, mainly Italian.

426. ŠEBENIK, M.

Rak kestenove kore u kotaru Nova Gorica. (Chestnut bark canker in the district of Nova Gorica.) [French summary ½ p.]

Zasht. Bilja, Belgrade, 1951, No. 5, pp. 75-9 [received 1952].

A further short paper on the occurrence of *Endothia parasitica* in the Panovec forest in the district of Nova Gorica, near the Italian frontier. The means by which the disease was introduced, most probably from Italy, and the danger of its spread to the whole chestnut growing industry of the Balkans are discussed.

427. DENGLE, H. W.

Evaluate Asiatic chestnuts for blight resistance.

Amer. Nurseryman, 1952, 96(8): 10, 77.

Notes are given on information obtained by a group of experts, including horticulturists, visiting Mount Alto state forest, Pa, to evaluate experiments in growing forest-type Asiatic chestnut trees as possible replacements for blight-killed American chestnuts. The plot inspected was one of the 21 similar trial plantings established through 8 states since 1936. Of the trees evaluated, some are proving superior in blight resistance, growth and productivity, and are used for propagation. Asiatic chestnuts are also being planted among native seedlings in the hope that natural hybridization may result in the development of immune or resistant hybrids.

428. NIKOLIĆ, V.

Mycosphaerella sentina and the possibility of protecting pears from it. [Serbian, English summary ½ p.]

Zasht. Bilja, Belgrade, 1950, No. 1, pp. 66-74, bibl. 2, illus. [received 1952].

To control leaf spot, *M. sentina*, on pear trees in Yugoslavia, 1% bordeaux mixture is recommended to be applied at the beginning of May. A second treatment is necessary only in wet seasons. In 1949 and 1950 mature ascospores were detected at the end of April or beginning of May. The infection period lasted for 4-5 days, the optimum temperature for germination being around 23° C.

429. JØRGENSEN, H. A.

Studies on *Nectria cinnabarina*—hosts and variations.

Yearb. roy. vet. agric. Coll. Copenhagen, 1952, pp. 57-120, bibl. pp. 4½, illus., being *Bull. Dep. Plant Path.* 35.

The writer does not consider *Nectria ribis* (Tode) Oud. to be a true species. He is of the opinion that the fungus which occurs on red currant must be regarded as a variety of *Nectria cinnabarina* and suggests that it be named *Nectria cinnabarina* var. *ribis* var. n. His reason is that the form of the fungus which occurs on red currant is able to infect many species other than those of the genus *Ribes*, and that forms from other hosts are capable of infecting red currant. However, the form which occurs on red currant is liable to produce somewhat larger ascospores and conidia than forms from the other hosts. [From author's conclusions.]

430. WOODHEAD, C. E., AND JACKS, H.
Nature and control of ripe spot of apples.
N.Z. J. Agric., 1952, 84: 239-40, bibl. 5.

Ripe spot (*Neofabraea malicorticis*) reduces the New Zealand apple crop every year. From the results of trials it is recommended to spray in mid-January with bordeaux mixture 2 : 6 : 100, and in mid-February with 1 : 4 : 100. Materials based on ziram are also recommended for trial by growers at a concentration of 2 lb. in 100 gal.

431. GOVI, G.
Un marciume di frutta immagazzinati
(*Phacidiopycnis furfuracea* (Rostr.) Jørst.).
(A rot of stored fruit caused by *Phacidiopycnis furfuracea*.) [English summary 7 lines.]
Ann. Sper. agrar., 1952, 6: 1121-9, bibl. 10, illus.

A short description is given of the rot, which was met with in Passe Crassane pears in cold storage in 1950-51, and of the morphology of the fungus. Pears, apples and quinces were successfully inoculated.

- 432.* REID, R. D.
Breeding strawberries resistant to red core root rot.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 9.

Strawberry breeding has been carried out since 1933 by the Department of Agriculture for Scotland with the collaboration of the West of Scotland Agricultural College, at Auchincruive, near Ayr. The objectives have been the production of varieties resistant to red core root rot (*Phytophthora fragariae* Hickman), of fruiting characters acceptable to commercial growers and to develop them free from other diseases. Very high resistance is obtained, but new strains of the causal organism attack previously resistant varieties. The main sources of resistance have been No. 52 (believed to be "Frith") and the American variety "Aberdeen". Other sources have been used more recently. Pure species have not helped, but "Little Scarlet", generally considered a form of *Fragaria virginiana*, appears to increase resistance. Inheritance of resistance is estimated on the proportion of seedlings to become infected in the first year of exposure to natural inoculum in infected soils. Susceptible varieties yield families of which 100% are susceptible, while resistant types may show less than 20% under similar conditions. A few varieties were released early in the work as a temporary expedient for local use but the main introduction up to date is the variety "Auchincruive Climax" now of very considerable importance throughout the British Isles. [Author's summary.]

433. NIKOLAEV, P. I.
The influence of minimum temperatures and humidity among the leaves of vine on the development of mildew. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 6, pp. 44-6, illus.

Observations made at the Magarač Institute for Viticulture show that the critical periods for the development of vine mildew occur when the minimum temperature reaches 13° C. and the humidity 80% in the crown of the vine. This, however, is not in agreement with the

theory of Miller who contends that the critical temperature and precipitation for the development of mildew must be calculated from a 24-hour average.

434. FOSCHI, S.
La forma ascofora dell'oidio del melo
(*Podosphaera leucotricha* (Ell. et Ev.) Salm.)
in Italia. (The ascigerous form of apple mildew in Italy.) [English summary 9 lines.]
Ann. Sper. agrar., 1952, 6: 1421-30, bibl. 11, illus.

The ascigerous form (*Podosphaera leucotricha*) of apple mildew, here reported in Italy for the first time, has been found in abundance on different varieties in different environments in recent years. The cause of the long interval (about 40 years) between the first appearance of the conidial form and that of the ascigerous stage is thought likely to be either heterothallism or the gradual adaptation of the parasite to its hosts.

435. ZOBRIST, L., AND FRÖLICH, H.
10 Jahre Versuche zur Bekämpfung des Apfelmehltaues (*Podosphaera leucotricha* [E. et E.] Salm.). (Ten years research on the control of apple powdery mildew.) [English summary 3 p.]
Phytopath. Z., 1952, 19: 431-40, bibl. 3, illus.

Apple powdery mildew has become very serious in Switzerland during the last ten years. A dormant spray will destroy the mycelium overwintering on the twigs, but is ineffective against the mycelium in the buds. Micronized wettable sulphurs with a wetting agent gave best control, 7 applications during the season being necessary. Quick succession of the pre-blossom and petal-fall applications is important. Only repetition for several years can guarantee success.—Biol. Lab., Dielsdorf-Zürich, Switzerland.

436. AERTS, R.
L'oidium du pommier. (Apple powdery mildew.)
Fruits belge, 1952, 20: 113-15.

Conclusions drawn by the author from studies at Gortem Research Centre are (1) that 2 types of infection coexist, the first affecting the whole shoot and resulting from a bud infected the previous year, and the second (secondary infection) localized in certain organs, often the leaves, and caused by conidia from the first type; and (2) that a complete cure is not at present attainable but that secondary infection can largely be prevented by applications of wettable sulphur.

437. BYRDE, R. J. W.
Experiments on the control of brown rot of apples and plums. III. Summer spraying trials.
J. hort. Sci., 1952, 27: 237-44, bibl. 13, illus.

In trials at Long Ashton in 1950 the following organic fungicides were tested as summer sprays for the control of brown rot (caused by *Sclerotinia fructigena* and *S. laxa*) on plums and apples: phenyl mercury chloride, 2:3-dichloro-1:4-naphthaquinone, and N-trichloromethylthio-tetrahydrophthalimide. On plums 2 applications (7 July and 3 August) gave no significant control. On apples 2 applications (mid-July and mid-August) of 0.05% 2:3-dichloro-1:4-naphthaquinone resulted in a substantial reduction of a relatively light

* See note, p. 3.

brown rot attack. Corresponding treatment with 0.005% phenyl mercury chloride afforded no control. Both these materials were liable to cause injury to the fruits, especially to plums. Evidence presented suggests that a marked reduction in tree-to-tree variability in the records of brown rot infection of plum fruits can be secured by a modified technique of disease recording, which takes into account the extent of fruit injury and differentiates between primary and contact infections.

438. WADE, G. C.

Brown rot of apricot investigations. Value of tetra-methyl thiuram disulphide and a potassium fertiliser for control.

Tasm. J. Agric., 1952, 23: 241-6, bibl. 2.

Results obtained in the past season confirm that tetra-methyl thiuram disulphide is a safe and effective spray for the control of brown rot of apricots [*Sclerotinia fructicola*]. It was shown that an application at petal fall, in addition to cover sprays given when ripening commences, is essential for satisfactory control. An additional spray at the full blossom stage did not improve control. Evidence was obtained that the potassium level of the trees influences susceptibility, and a soil dressing of 4 cwt. of potassium chloride, or spraying with 1% potassium chloride resulted in significant reduction in brown rot infection. Four sprays of 1% potassium chloride at monthly intervals was no better than a single spray a month before picking. Fruit did not become susceptible to air-borne infection until ripening commenced, and softening, as measured by a penetrometer, or change in ground colour from green to yellowish-green were satisfactory criteria. [Author's summary.]

439. POULOS, P. L., AND HEUBERGER, J. W.

Relation of wounds to the fruit rot phase of the brown rot disease of peaches.

Plant Dis. Repr., 1952, 36: 198-200, bibl. 7.

Data are presented which indicate that the use of effective insecticides, in conjunction with the regular fungicide schedule, aids significantly in controlling the fruit-rot phase of the disease caused by *Monilinia fructicola*.

440. PESANTE, A.

Nuove segnalazioni di *Septobasidium*. (New cases of *Septobasidium*.) [English summary 3 lines.]

Ann. Sper. agrar., 1952, 6: 655-9, bibl. 1, illus.

A new species of *Septobasidium*, near *S. alni*, was recorded on *Corylus avellana* in 1950.

441. OORT, A. J. P.

Taksterfte bij bramen veroorzaakt door *Septocytia ramealis* (Rob.) Pet. (Die-back of blackberry caused by *Septocytia ramealis* (Rob.) Pet.) [English summary ½ p.]

Tijdschr. PLZiekt., 1952, 58: 247-50, illus.

A study was made of a dieback of blackberries which was causing a serious crop reduction in the province of Gelderland, Holland. One of the causes was found to be the fungus *Septocytia ramealis*. Spores were produced from the beginning of April till the end of August except in dry periods. New infections did not appear during the summer. Inoculation experiments showed that the appearance of spots was promoted by cold

treatment. For control it is recommended to spray the young shoots with copper compounds or carbamates until the end of July. To prevent infection of new plantations, layers should be removed from the old plantations as early in spring as possible, and no part of the old stem should be left attached to them.—Lab. Phytopath. LandbHoogeschool, Wageningen.

442. PUPILLO, M., AND DI CARO, S.

Alcune osservazioni sulle *Septoria* del pistacchio. (Some observations on *Septoria* on pistachio.) [English summary ½ p.]

Ann. Sper. agrar., 1952, 6: 623-34, bibl. 6, illus.

A description is given of a serious fungal disease in the pistachio tree due to *Septoria pistaciae* and *S. pistacina*. Its symptoms are leaf spotting and defoliation. Through the consequent shortage of nutrients the yield in the year of attack is reduced. That of the following year is also affected through imperfect lignification of the branches. Heavy and repeated attacks can endanger the tree's life. Treatment with copper sulphate before and during the growing period was efficacious at Acireale Experimental Station.

443. GROSJEAN, J.

Natuurlijk herstel van loodglansziekte. (Natural recovery from silver-leaf disease.) [English summary ½ p.]

Tijdschr. PLZiekt., 1952, 58: 109-20, bibl. 12.

Observations were made during the years 1944 to 1950 inclusive on Victoria plum trees affected with silver leaf (*Stereum purpureum*), some of the trees being untreated, others treated with solid oxyquinoline sulphate inserted in holes bored in the stems. The treated trees showed significantly better recovery than untreated trees. The incidence of the disease varied greatly from year to year. In 1945 and 1947 the disease was generally slight and the highest rate of recovery occurred. In these two years the weather in spring changed more quickly from winter to summer temperatures than in other years. Similar climatic conditions prevail in continental areas, and in these silver leaf disease is of little or no importance.

444. MARTINOVIĆ, M.

Protection of plum trees from *Taphrina pruni*. [Serbian, English summary ¾ p.]

Zasht. Bilja, Belgrade, 1951, No. 8, pp. 33-8, bibl. 7.

Taphrina pruni is widespread in Yugoslavia and constitutes a serious threat to the important plum variety Požegača. Rain during flowering is favourable to the disease. In trials conducted from 1947 to 1951 excellent control was obtained by spraying the trees from crown to base, 3-4 weeks before blossoming, with either 1-3% bordeaux mixture or lime sulphur. Applications of ammonium dinitrocresolate were also found satisfactory and in addition destroyed all lichens and moss on the trees.

445. CANOVA, A.

Marciume delle pere causato da lieviti. (Rot in pear fruits caused by yeasts.) [English summary 11 lines.]

Ann. Sper. agrar., 1952, 6: 367-71, illus.

A description is given of rot in pears caused by 3 yeasts,

Torulopsis pulcherrima, *Mycotorula* sp., and *Saccharomyces apiculatus*. The yeasts gain entry through wounds in the skin and infection is favoured by damage from insects which are probably vectors.

446. CROXALL, H. E., GWYNNE, D. C., AND JENKINS, J. E. E.

A rapid assessment of apple scab on fruit.

Plant Path., 1952, 1: 89-92, bibl. 3, illus.

A standard diagram method of assessing apple scab on fruit is described and categories from 0.25% to 5% infection are shown diagrammatically. Scabbed areas above 1% exceed the maximum blemish tolerated for "Fancy R" grade dessert apples, and areas over 3.5% exceed the maximum amount of blemish allowed for even "Domestic R" grade cooking apples.—N.A.A.S. Newcastle-on-Tyne, and Evesham.

447. PANJAN, M.

Određivanje roka prskanja protiv krastavosti (fuzikladija) jabuke. (Determination of the time for spraying against apple scab.) [English summary $\frac{3}{4}$ p.]

Zashit. Bilja, Belgrade, 1951, No. 3, pp. 31-40, bibl. 14.

In trials in 1946-1948 to determine the best date for spraying against apple scab, spraying immediately after the discharge of ascospores under laboratory conditions was found most satisfactory, for if rain occurred the spores were discharged in the field a few days later. For the development of the perithecia optimum temperatures as well as humidity are of importance. The 3 years' observations have shown that the ascospores are ripe when the first green leaflets appear, and in case of rain the first spray treatment should be applied immediately.

448. MIRIĆ, M.

Investigation on the possibility of establishing a spray warning service against apple scab in Yugoslavia. [Serbian, English summary $\frac{3}{4}$ p.]

Zashit. Bilja, Belgrade, 1951, No. 5, pp. 54-66, bibl. 11.

Results of 2 trials conducted in 1950 have shown that well timed spray applications can prevent both early and late scab [*Venturia inaequalis*] infection of apples. In trials at Uzička Požega 1% bordeaux mixture applied to 11 varieties on April 16 and May 10 gave good control of scab on all except Kolačara, which was given an additional treatment on June 12. At Radmilovac, 1% bordeaux or 0.15% duphar (a mercury preparation) was applied as a pre-blossom spray on April 1 to some varieties and on April 11 to others, followed by 2 simultaneous treatments of all varieties on April 27 and May 10. In spite of drought, the control trees were heavily infected, while on the treated trees practically no scab was observed.

449. MINISTER OF AGRICULTURE, CANADA.

Control of apple scab.

A.R. Canada Minist. Agric. for 1950/51, pp. 27-8.

Much better control materials have become available with the development of eradicator fungicides such as tag, puratized apple spray and phygon. Protectant fungicides have often failed to give control, but good

control was obtained under commercial orchard conditions in Nova Scotia with eradicator sprays applied immediately after periods of infection. Experiments in S.W. Quebec indicated that eradicator hold little promise except to supplement the protectant spray schedule when unfavourable weather has delayed application of the regular schedule. In trials at St. Catharine's primary scab infection was well controlled by 16 treatments tried (including the new Crag 341 SC and Kolofog 100), but results were definitely superior when the organic fungicides, tag, phygon and orthocide (SR406), which have eradicator properties, were applied, and remained so throughout the period of secondary infection. Excellent control of late pin-point scab on the fruit was obtained with bordeaux 2½–5–100 in the 3rd cover spray.

450. BURNET, I. M.

Controlling scab on apples.*

Fruitgrower, 1952, No. 2961, pp. 553-4.

In trials at Fernhurst Research Station, ferbam, glyoxalidine and dichloronaphthaquinone gave very satisfactory reduction of apple scab. In further tests various mercurial fungicides were used, all showing good promise, and a new compound has been developed containing 2.5% Hg as phenyl mercury acetate which has been recommended at 0.125% concentration. Among the disadvantages of mercurial compounds are their comparatively short residual action, their slight phytotoxicity, and their inability to check red spider build up. In spite of this, mercury is considered to be a very promising sulphur substitute in a modified spray programme.

451. REFATTI, E., LEPORI, L.

Ticchiolatura tardiva di magazzino su frutti di pero. (Late scab in stored pears.) [English summary $\frac{1}{2}$ p.]

Ann. Sper. agrar., 1952, 6: 1217-34, bibl. 8, illus.

Late attacks of scab (*Fusicladium pyrinum*) occurred in Curato pears in storage in December 1950 and 1951. Macroscopic and microscopic descriptions of the condition are given. The symptoms differed from those of scab in the field, the black corky spots, fissuring and deformity of the fruit being absent. Infection probably occurred shortly before harvest, a period characterized by high rainfall and humidity and moderate temperatures. Late spraying of the crop is recommended when conditions conducive to infection exist.—Mycol. Lab., Pavia.

452. KLINDIĆ, O., AND MILATOVIĆ, I.

Krastavost Japanske mušmule. (Loquat scab.) [English summary 11 lines.]

Zashit. Bilja, Belgrade, 1951, No. 5, pp. 39-43, bibl. 10, illus.

In 1950 leaves, branches and fruit of loquats, *Eriobotrya japonica*, from the island of Korčula (Southern Dalmatia) were found to be severely infected by *Fusicladium dendriticum* var. *eribotryae*. It appears that the disease, probably introduced from Italy, has been spreading in Yugoslavia for some time, as during the same year it was also observed on the island of Lussin (Northern Adriatic) and near Dubrovnik.

* A summary of this paper was given at the 3rd International Congress on Crop Protection in Paris.

453. THE FUNGICIDE COMMITTEE OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY.
1950 summary of results of fungicide tests on fruit and nut trees.

Plant Dis. Repr., 1952, **Suppl.** 210, pp. 23-31.

Results are summarized of observations made in the United States and Canada. More than half the report concerns apple scab, but other apple diseases are mentioned (cedar rust, fire blight, sooty blotch, bitter rot, black rot, and powdery mildew), as well as pear scab, peach bacterial spot, cherry leaf spot and brown rot, grape black rot, strawberry leaf spot, phytophthora brown rot and botrytis blossom blight of lemon, pecan scab and walnut bacteriosis.

Nematodes.

454. CHITWOOD, B. G., AND OTEIFA, B. A.
Nematodes parasitic on plants.
Annu. Rev. Microbiol., 1952, **6**: 151-84, bibl. 270.

This extensive review deals with taxonomy, host range and bionomics of the various genera, and physiological behaviour and control.

455. LINDHARDT, K.
Undersøgelser over angreb af nematoder på jordbaer i Danmark. (A study of nematode infestation of strawberries in Denmark.) [English summary 2½ pp.]
Tidsskr. Planteavl, 1952, **55**: 658-99, bibl. 35, illus.

The paper is largely devoted to taxonomic and biological studies of *Aphelenchoides* spp. *Aphelenchoides ritzema-bosi* and *A. fragariae* are common in Denmark but cauliflower symptoms were caused only on the varieties J. A. Dybdahl and on Königin Luise. In some areas, however, where strawberries are grown commercially, eelworm infestation is of considerable economic importance. Immersion of runners and shoots in 0.08% Bladan E605 (33%) failed to kill all nematodes. In the absence of effective chemical control preventive measures, such as roguing, have to be adopted and better use should be made of the certification scheme operating in Denmark. A list of varieties arranged in order of susceptibility has been compiled by the author on the basis of his own observations and growers' experiences. On a piece of land that had been previously planted to daffodils, strawberry plants were found to be attacked by *Ditylenchus dipsaci*. The symptoms of this as well as of the *Aphelenchoides* infection are described. *Lilium longiflorum* and *L. philippense* were other host plants of *Aphelenchoides fragariae* shown to be naturally infected. A reliable method of inoculating strawberry plants with eelworms by means of filter paper is described.—Royal Veterinary and Agricultural College, Copenhagen.

456. BROOKS, A. N., AND CHRISTIE, J. R.
A nematode attacking strawberry roots.
Proc. Fla. St. hort. Soc. for 1950, pp. 123-5 [received Nov. 1952].

The ectoparasitic sting nematode, *Belonolaimus gracilis*, has been identified as the cause of a strawberry root disease in Florida. Good crops have been grown on infected land following soil fumigation. [See also *H.A.*, 22: 3634.]

Mites.

457. PRITCHARD, A. E., AND BAKER, E. W.
A guide to the spider mites of deciduous fruit trees.

Hilgardia, 1952, **21**: 253-87, bibl. 22, illus.

As a guide to their identification, descriptions, supported by illustrations and a taxonomic key, are provided for the following species: *Bryobia praetiosa*, *Metatetranychus ulmi*, *Paratetranychus newcomeri*, *Eotetranychus carpinii borealis*, *E. willamettei*, *E. uncutus*, *Tetranychus pacificus*, *T. mcdanieli*, *T. schoenei*, *T. canadensis*, *T. bimaculatus* and *T. atlanticus*.

458. FJELD DALÉN, J.
Midder på frukttrær og baervekster. Biologi og bekjemping. (Red spider mites of top and small fruit. Biology and control.)
Frukt og Baer, 1952, **2**: 56-72, bibl. 35, illus.

The review includes tabulated data of Norwegian trials on the control of red spider mites on apple and strawberry which were carried out 1948-51 in various parts of the country.

459. TUNBLAD, B.
Till bekämpningen av rött spinn. (On red spider control.)
Växtskyddsnotiser, 1952, No. 1, pp. 12-14.

Following a review of new acaricides a brief report is given, without figures, on the results of spraying trials for the control of fruit tree red spider. An examination of the leaves of treated trees after 10 days showed EPN 300 to have the strongest immediate action followed by the two experimental preparations, Aramite (chloroethyl-*[butylphenoxy]-alphaethylsulphite*) and Dimite (diparachlorophenyl-methylcarbinol). A re-examination after another 20 days, however, proved Pestox 3 and summer oil emulsions to have a more lasting effect due to their ovicidal action.

460. LALATTA, F.
Prove di lotta contro il ragno rosso del melo. (Experiments on the control of red spider on apple.) [English summary 3 lines.]
Riv. Fruttic., 1952, **14**: 159-66, bibl. 5.

Experiments in the control of *Metatetranychus ulmi* were conducted in an apple orchard in Ravenna in 1952. 0.18% Aramite 15W applied at the end of April and again in mid-May caused 100% mortality by the end of May when there were 82 mites per leaf in the control. Pestox 66 applied at a concentration of 0.17% at the end of April and 0.15% in mid-June caused 98% mortality. Both showed considerable residual action which destroyed larvae that hatched several days after spraying. Both kept a heavily attacked area almost free from infection for 2½ months.

461. BOYCE, H. R.
Trials of acaricides against the European red mite, *Metatetranychus ulmi* (Koch), on apple.
82nd A.R. ent. Soc. Ontario 1951, 1952, pp. 17-21, being *Contr. Div. Ent., Sci. Serv. Dep. Agric., Ottawa 2931*.

At Harrow, Ontario, p-chlorophenyl p-chlorobenzenesulphonate, as a 50% wettable powder, gave consistently effective control of the European red mite on apple for three seasons, without introducing problems of incompatibility or phytotoxicity. As this material has low

human toxicity it should serve as an effective and less hazardous substitute for parathion in the control of the European red mite in Ontario. In a trial for one season only, R-242 did not appear to give satisfactory control over a sufficient period. [Author's summary.]

462. ROESLER, R.

The gooseberry mite (*Bryobia praetiosa* Koch) in the Palatinate.

Höfchen Briefe (English edition), 1952, 5: 15-18, illus.

The biology of *B. praetiosa* [which is not confined to gooseberry] and its control by sulphur preparations, E605 and Systox, are discussed. Spraying of fruit trees should be limited to the pre- and post-blossom periods, the latter being of particular importance. Thorough applications are necessary, especially on the underside of old branches.—Landesanst. Wein-, Obst- u. Gartenbau, Neustadt/Weinstrasse.

463. WILSON, N. S., AND COCHRAN, L. C.

Yellow spot, an eriophyid mite injury on peach.

Phytopathology, 1952, 42: 443-7, bibl. 6, illus.

A disorder of peaches termed "yellow spot" is characterized by yellow spotting and vein-associated chlorosis of leaves, longitudinal rolling of leaves, and stem spotting. Symptoms were readily reproduced by experimentally controlled feeding by the mite *Vasates cornutus*. After the initial feeding of the mites, there was a delay of about 10 days before symptoms were observed.

464. VAN DINTHER, J. B. M.

Bestrijdingsproeven tegen *Eriophyes avellanae* Nal. en *Eriophyes gracilis* Nal. (Experiments for the control of *Eriophyes avellanae* and *E. gracilis*.) [English summary 14 pp.]

Tijdschr. PlZiekt., 1952, 58: 96-103, bibl. 2.

Experiments are described for the control of *Eriophyes gracilis*, the mite that causes yellow leaf spots on raspberry, and *E. avellanae*, the hazel nut gall mite, the methods developed being based on differences in their biology, the former hibernating in the narrow space between the leaf petiole and the axillary bud and between the outer bud scales, the latter inside the deformed swollen buds ("big buds"). 5% and 7% tar-oil spray or 5% mineral oil (W.E.103), applied at the beginning of March before bud-burst, will kill 50% of the hibernating raspberry mites, but the nut gall mite is unaffected. 0.75% wettable sulphur (Thiovit) applied early in May gives good results against the raspberry mite. Five treatments with Thiovit in spring were particularly effective against nut gall mite.

Insects.

465.* MASSEE, A. M.

Fluctuations in orchard fauna.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 8, bibl. 5.

A study of the insect fauna of the [English] apple orchard during the last fifty years shows that several important changes have taken place. At the beginning

* See note, p. 3.

of the present century about sixty species of apple pests occurred in the orchards. A wide range of beneficial species were present also. During the course of years, as new sprays were introduced and new and better spraying machines became available, the number of important pests tended to decrease, but those which remained were still causing injury to the crop. Since the introduction of DDT and BHC only four important apple pests remain, they are the fruit tree red spider mite (*Metatetranychus ulmi* Koch); the summer fruit tortricid (*Adoxophyes orana* F.R.); the codling moth (*Cydia pomonella* L.); and the woolly aphid (*Eriosoma lanigerum* Hsmnn.). Less harmful species occur from time to time but are not important. Beneficial insects are not so prevalent in sprayed apple orchards today as formerly, and it is not considered that the spray programme will be fully efficient until greater importance is attached to their preservation. [Author's summary.]

466. LOEWEL, E. L., AND REICH, H.

Ergebnisse der Zweiguntersuchungen auf Schädlinge im niederelebschen Obstanbauggebiet und die sich daraus ergebenden Folgerungen für die Obstbaumspritzung. (Results of branch examinations for eggs of fruit tree pests in the lower Elbe fruit growing district in relation to fruit tree spraying.)

Nachr.Bl. dtsh. PflSchDienst., Braunschweig, 1952, 4: 153-6.

For the last five years a determination has been made of winter egg-laying on branches of Belle de Boskoop apples with reference to apple sucker (*Psylla mali*), apple aphid (*Doralis pomi*), red spider mite (*Paratetranychus pilosus*), and winter moth (*Cheimatobia brumata*). A length of 1 m. of fruiting wood was examined in each case, the samples being sent by growers who were then informed of the result of the examination and given advice with regard to control measures.

467. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

Insect pests.

Agric. Gaz. N.S.W., 1952, 63: 377-80, 422-5, 430.

These notes include descriptions with control measures of the black peach aphid (*Anuraphis persicae-niger* now *Brachycaudus prunicola*), San José scale (*Quadraspidiotus perniciosus*), and the codling moth (*Cydia pomonella*).

468. FRANKLIN, H. J.

Cranberry insects in Massachusetts.

Bull. Mass. agric. Exp. Stat. 445, Suppl., 1952, pp. 15.

In this supplement to Bulletin 445 [*H.A.*, 19: 1968 and 21: 3417] further information is given on the incidence of scale insects and on the control of some other pests.

469. TAYLOR, G. G.

Spray treatments for control of woolly aphid (*Eriosoma lanigerum* (Haus.)) on apple trees. *N.Z. J. Sci. Tech.*, Sect. A., 1952, 34: 258-65.

Results of spray experiments for control of woolly aphid (*Eriosoma lanigerum*) show that BHC gave a high degree of control when used as dormant and as summer sprays. Where sprays were prepared with refined BHC containing 99 per cent. isomer, tainting of fruit did not occur, even when the spray was applied three weeks from harvest. DDT sprays applied in the growing

season were found to kill large numbers of the parasite, *Aphelinus mali*, but did not affect woolly-aphis. DDD failed to control woolly-aphis but caused almost complete eradication of *A. mali*. Dormant sprays of DNC-oil emulsion failed to control woolly-aphis. Dormant and summer sprays of parathion gave partial control of woolly-aphis but at comparable dosage rates were not so effective as BHC. The addition of winter petroleum oils to BHC and parathion sprays gave only a small improvement in control. [From author's summary.]

470. BORG, Å.

Undersökningar över *Aphelinus mali* Hald. —blodlusens (*Eriosoma lanigerum* Hausm.) speciella parasit. (A study of *Aphelinus mali*, the woolly aphid parasite.) [English summary 6½ pp.]
Medd. Växtskyddsanst. 60, 1952, pp. 75, bibl. 5½ pp., illus.

In the important fruitgrowing area of western Scania woolly aphid is widely established, but most of the colonies are parasitized by *Aphelinus mali*. The biology of the parasite was studied at the Åkarp branch of the Swedish Plant Protection Station and tests were carried out to determine the effect of insecticides on *Aphelinus*. Winter washes (tar oil and DNOC in oil emulsion) at 8-12% were found to cause a mortality of the parasite in dead woolly aphid of 56-87%, as compared with a mortality of 25% on unsprayed apple twigs. The emergence from parasitized woolly aphid sprayed with BHC or nicotine or fumigated with HCN was satisfactory, but DDT and BHC proved to have a deadly effect on the imago, with a residual action of 30 days in the case of DDT.

471. SOLAROLI, V., AND BONGIOVANNI, G. C.

Insetticidi sistemici ed altri prodotti contro l'afide verde del melo. (The control of the green apple aphid (*Aphis pomi*) with systemic and other insecticides.)

Ital. agric., 1952, 89: 479-83, illus.
In continuation of previous research [see H.A., 21: 2527] experiments were conducted at Ferrara on 7-year-old apple trees with systemic and other insecticides. The 2 systemic insecticides (Systox at 0.1% and Pestox at 0.25%) gave almost complete control up to the end of the experiment (11 days), while with others reinfestation began after 2-4 days.

472. REICH, H.

Ein neuartiges Schadbild des Apfelblütenstechers (*Anthonomus pomorum* L.). (A new type of injury caused by the apple blossom weevil.)

Mitt. ObstbVersuchsrings Jork, 1952, 7: 146-8, bibl. 5, illus.

The apple blossom weevil, normally well under control in the Altenland near Hamburg, caused much damage in 1952. A new type of fruit injury, reminiscent of capsid bug stings, is described and illustrated.

473. MAXWELL, C. W. B.

The overwintering habits of the strawberry weevil, *Anthonomus signatus* Say (Coleoptera: Curculionidae), in New Brunswick. 82nd A.R. ent. Soc. Ontario 1951, 1952, pp. 25-8, bibl. 3, being Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa, 2953.

In New Brunswick the strawberry weevil hibernates largely within strawberry and raspberry plantations. Successful hibernation depends on adequate cover, provided by vigorous plants, straw or snow. Burning of strawberry plantations in early spring had little or no effect on the weevils, but in a ploughed field no weevils were found the following spring.

474. GHILLINI, C. A.

Gommosi traumatica e deperimento dei ciliegi e dei peschi. (Wound gummosis and decline in cherry and peach trees.) [English summary 4 pp.]
Riv. ortoflorofruttic. ital., 1952, 36: 174-82, bibl. 8, illus.

In 1948 the author stated that moria decline in the cherry tree is due to lesions caused by scolytid beetles. Further research has confirmed that the attacks by *Scolytus rugulosus* are the primary cause. The decline, which chiefly affects cherry and peach trees, is more serious in the hills than on the plains due to the relatively poorer water and nutrient supplies, and commoner near stands of elm affected by elm disease.

475. JANCKE, O.

Weitere Untersuchungen über den Birnprachtkäfer und seine Bekämpfung. (Further studies on the sinuate pear tree borer and its control.)

Höfchen Briefe, 1952, 5: 63-74, bibl. 5, illus., maps.

The mass incidence of the sinuate pear tree borer (*Agrilus sinuatus*) in the Rhineland in recent years and epidemics of the pest in the same area during the last century were found to be associated with hot, dry weather in June. Spraying with E605+DDT or with DDT alone gave good control and laboratory tests suggested the effectiveness of BHC. Applications should be timed to coincide with the hatching of the beetle of which German pear growers are notified by a warning service. The spray should be directed also against the bark of affected trees. If a repetition of the treatment is required it should be carried out 8-10 days after the first application. The biology of the pest, its distribution in Germany and its hosts are discussed.—Landesanst. f. Wein-, Obst- u. Gartenbau, Neustadt/Weinstrasse.

476. BAERG, W. J., AND WARREN, L. O.

Insecticidal control of the strawberry crown borer during 1950 and 1951.

Rep. Ser. Ark. agric. Exp. Stat. 28, 1951, pp. 6, bibl. 5, illus.

Two pre-harvest applications of 20% toxaphene dust, aimed to kill the adult strawberry crown borers, *Tyloderma fragariae*, before much oviposition has taken place, greatly reduced infestation. An immediate post-harvest treatment further reduced the borer infestation on one experimental plot.

477. CHRESTIAN, P.

Résultats acquis dans la lutte contre le capnode. État actuel de la question. (Capnodis control: the present position.)
Fruits d'Outre Mer, 1952, 7: 199-207, bibl. 13.

This review of French research covers control of *Capnodis tenebrionis* by destruction of eggs, of hatching

larvae and larvae in the roots, and of adults on emergence and on the trees.

478. RINGS, R. W.

Experimental control of plum curculio on peaches.

J. econ. Ent., 1952, 45: 436-44, bibl. 3. *

Cage tests made at Ohio Agricultural Experiment Station indicate that a fair number of insecticides possess a high degree of toxicity to the plum curculio, *Conotrachelus nenuphar*. Ethyl p-nitrophenyl thionobenzene phosphonate and dieldrin gave excellent results in 2 years of field tests on Elberta peaches, and heptachlor, used only during 1 year, was equally effective. Aldrin was found satisfactory in both years, but the effects of the other insecticides tested were variable.

479. BORCHERS, F.

Bekämpfung der Maikäfer. (Cockchafer control.)

Kommentator G.m.b.H., Frankfurt/Main, 1952, 8×6 in., pp. 91, bibl. 145, illus.

The pamphlet is published by the official German journal, *Gesunde Pflanzen*. It discusses the results of large-scale cockchafer operations, most of them undertaken in Switzerland and Germany, as well as the equipment used, as a guide to further action.

480. GALLAY, R.

Le hanneton et le ver blanc. Nouveaux enseignements, nouveaux procédés de lutte. (Cockchafer and white grub. New information, new methods of control.)

Rev. romande Agric. Vitic., 1952, 8: 73-84, maps.

Flight years of the cockchafer in Switzerland and control by cultural methods are discussed.

481. DOLGOVA, A. E.

BHC for the control of cockchafer larvae.

[Russian.]

Vinodelie i Vinogradarstvo, 1952, No. 4, p. 45.

BHC and DDT at 2:1 ratio applied around the stems of vines gave 100% control of cockchafer larvae in vineyards situated on sandy soils near woodlands at Kiev.

482. BANERJEE, S., AND CHATTERJEE, N. C.

***Gonocephalum planatum* Walker, a new pest in India on mulberry seedling and its control.**

Sci. and Cult., 1952, 18: 36-7, bibl. 3, illus.

Gonocephalum planatum caused 40% mortality among mulberry seedlings at Ranaghat, W. Bengal, in 1950, by attacking the roots and main stems. 72 hours after 15 lb. 5% BHC per acre had been incorporated in the soil to a depth of 2-4 inches 97% of the beetles were dead.

483. TOMINIĆ, A.

Stjenica loznog cvijeta u vinogradima konavlja. (*Calocoris fulvomaculatus* on the flowers of vines in the vineyards of Konavlje.) [French summary 1½ pp.]

Zasht. Bilja, Belgrade, 1951, No. 5, pp. 3-12, bibl. 6.

Calocoris fulvomaculatus was found to cause serious damage in the vineyards of Konavlje near Dubrovnik,

destroying up to 70% of the crop in years when warm winds and high humidities prevail. The capsid overwinters in its egg stage under the bark of old stems. Its other host plants include willow, nettles and potatoes. Of the control measures tried, winter washes of tar oil emulsion or carbolineum gave unsatisfactory results, but 2 summer treatments with Pantakan dust, containing 2.5% or 5% DDT, were very effective.

484. AVIDOV, Z.

Occurrence of Mediterranean fruit fly in a plum orchard at Mikveh-Israel (1945-1949).

[Hebrew, with English summary 3½ pp.]

Ktavim, 1950, Vol. 1, Hebrew pp. 233-44, bibl. 14, English pp. 51-4.

From the data described it is concluded that the population of *Ceratitis capitata* is depressed by extreme weather conditions, such as frost, hot dry winds or drought. Studies on the distribution of flies in different parts of Japanese plum trees indicate that summer applications of insecticides should be directed to all parts of the tree, including the centre, and not to one side only as previously recommended.

485. BOSELLI, F.

Esperimenti di lotta con DDT contro la *Ceratitis capitata* Wied. in Sardegna nel 1951. (Experiments on the control of *Ceratitis capitata* with DDT in Sardinia in 1951.) [English summary 7 lines.]

Ann. Sper. agrar., 1952, 6: 1011-1020.

In these experiments, which were conducted as a result of the destruction of more than 80% of the Sardinian peach crop by the Mediterranean fruit fly in 1950, the rate of attack in peach orchards was reduced to 2% in early varieties, 10-12% in mid-season varieties and 22% in a late variety by spraying every 2-4 days with a 1% aqueous solution of 25% DDT. Reported losses in adjacent orchards were 40-85%.—Phytopathological Observatory, Cagliari.

486. RICHARDSON, H. P., ROBINSON, A. G., AND ALLEN, W. R.

Chemical control of the currant fruit fly, *Epochra canadensis* Loew (Diptera: Trupaneidae), in Manitoba.

82nd A.R. ent. Soc. Ontario 1951, 1952, pp. 29-33, bibl. 4, being *Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa* 2950.

In a laboratory trial at Brandon, Man., a single application of ¼ or ½ lb. of DDT in 100 gal. was inadequate for the control of currant fruit fly. In field tests, a pre-blossom application of as much as 2 lb. of DDT per 100 gal. did not improve control. Two post-blossom applications at ½ lb. of DDT or methoxychlor per 100 gal. gave effective control of the flies on red currants and gooseberries, but resulted in an increase of mites, anthracnose, and mildew, causing extensive defoliation.

487. NONVEILLER, G.

Jedna kod nas malo poznata štetočina voćaka. (*Ceresa bubalus* on fruit trees in Yugoslavia.) [French summary ½ p.]

Zasht. Bilja, Belgrade, 1951, No. 5, pp. 67-72, bibl. 15, illus.

The buffalo leaf-hopper, *C. bubalus*, has been known in Yugoslavia since about 1934, and is fairly widespread in the country attacking various fruit species including

apples. The main morphological and biological characteristics of the insect are described and the injury it causes are discussed. No effective control measures are known, winter treatment with an oil emulsion or miscible oil having proved unsatisfactory. It is suggested, however, that no legumes should be grown in infested orchards.

488. HALLEMANS, A.

Een paar nieuwere fruitparasieten van actueel belang. (Some new fruit parasites of importance today.)

Cult. Hand., 1952, 18: 449-51, illus.

Brief notes are given on some virus diseases of fruit trees observed in the Netherlands, and on the pear leaf-curling midge (*Dasyneura piri*). For control of the midge 25% parathion, 75 cc. in 100 litres water, is recommended.

489. BACHMANN, F., AND VOGEL, W.

Das starke Auftreten von Raupenschädlingen im Fricktal. (A severe outbreak of caterpillar pests in the Fricktal, Switzerland.) *Schweiz. J. Obst- u. Weinb.*, 1952, 61: 374-6.

In the spring of 1952 a mass incidence of the following pests was reported from the Fricktal and other areas of northern Switzerland: Winter moth (*Cheimatobia brumata*), fruit tree tortrix moth (*Argyroplote variegana*) *Tmetocera ocellana*, *Hyponomeuta* sp. and others. Control measures are briefly discussed.

490. LEKIĆ, M. B.

The biology of codling moth in the people's republic of Serbia, and measures for its control. [Serbian, English summary 1½ pp.] *Zasht. Bilja*, Belgrade, 1950, No. 1, pp. 32-65, bibl. 11, illus. [received 1952].

During the past few years codling moth infestation reduced the value of all top fruits produced in Serbia by 20-25%, the heaviest losses being inflicted on apples and pears. Observations made in 4 districts have shown that 2 generations occur during a normal season but in some years moths from a third brood appear, which are, however, of no economic importance. For the control of first generation larvae 2 spray applications of the following insecticides were found very effective: 0.4% lead arsenate, 5% and 10% DDT in 1% emulsion and a commercial pyrethrum preparation "Piretroid". The efficiency of all 3 chemicals was improved by the addition of the colloidal resin spreader "Vikos" at 0.2% concentration. The best results were obtained when the treatment was made 1-2 days before the hatching of larvae, namely 12-15 days after the emergence of the first moths. The date for this was established by bait-trapping the moth, for which purpose a screen cage was found most suitable. Against the possibility of a second brood, the use of β -naphthol treated bands is recommended.

491. TADIĆ, M. D.

The number of codling moth generations in some orchard districts of Yugoslavia. [Serbian, English summary ½ p.] *Zasht. Bilja*, Belgrade, 1951, No. 5, pp. 44-9, bibl. 10, illus.

Observations made at 17 centres of the main fruit growing areas have shown that the codling moth has more than one and most probably two complete generations

in Yugoslavia. The number of spring and summer populations was found to be about equal. The possibility of a third, economically unimportant, generation is mentioned.

492. TADIĆ, M. D.

Trials with bands for the control of codling moth. [Serbian, English summary ½ p.] *Zasht. Bilja*, Belgrade, 1951, No. 3, pp. 13-30, bibl. 11, illus.

Untreated corrugated bands, used for the additional control of codling moth from end of June to end of August, should be changed every 15 days. Of the chemically treated bands, those treated with 0.75 kg. β -naphthol dissolved in 2 l. mineral oil gave the best result. The replacement of β -naphthol with other chemicals including DDT reduced efficiency. Stems of apple varieties sensitive to β -naphthol fumes should be protected by smooth paper placed under the bands.

493. BEVILACQUA, I.

Due anni di ricerche sulla lotta contro la *Cydia pomonella*. (Two years' research on the control of *Cydia pomonella*.) *Riv. ortoflorofruttic. ital.*, 1952, 36: 130-4, bibl. 1.

The results are given of experiments conducted near Modena in 1949-51 to study the effect on the codling moth of various treatments with parathion insecticides and lead arsenate. Both were efficacious separately, and a mixture of even a small dosage (0.2%) of lead arsenate with parathion was better than either.

494. BUSCAROLI, G. F.

Sperimentazione con parathion contro la *Carpocapsa pomonella* L. (Tests with parathion against codling moth.) [English summary 11 lines.] *Riv. Fruttic.*, 1952, 14: 166-70.

In tests with parathion against codling moth on 12-year-old Abbondanza apple trees 3 treatments were given: (1) 4.66% parathion at 35 c.c./l.; (2) 0.5% lead arsenate; and (3) a mixture of (1) at 25 c.c./l. and (2). Spraying took place on 22 May, 6 June, 20 July, 10 August and 29 August, the first 2 applications being timed to combat the first generation, and an anti-scab product being added to the first 3. (1) and (3) gave 93% clean fruit, (2) 88%, a satisfactory figure, and the control 47%.

495. TADIĆ, M. D.

The oriental fruit moth in Yugoslavia. [Serbian, English summary ½ p.] *Zasht. Bilja*, Belgrade, 1951, No. 8, pp. 50-4, bibl. 8, illus.

The incidence of oriental fruit moth, *Cydia molesta*, on peaches is recorded. According to growers of the Smederovo district, where the infestation is the heaviest, the moth has been introduced from Italy on imported peach trees. Control measures tried abroad are briefly reviewed, of which the establishment of parasites appears most promising.

496. PAISSANIDIS, S. E.

Nuevo parásito en los manzanares de Río Negro (*Eulia loxonephes*). (*Eulia loxonephes*, a new pest of apples in Río Negro.) *Rev. argent. Agron. B. Aires*, 1952, 19: 185-6, bibl. 3.

The microlepidopteron, *Eulia loxonephes*, was recorded as a pest of apples in Rio Negro for the first time in 1952. It was first found in Argentina in 1936 on dahlias. It also feeds on flax, cosmos, *Baccharis salicifolia*, *Solanum bonariense* and *S. pseudocapsicum*. The caterpillar attacks the terminal leaves of apple shoots, eating the upper epidermis and mesophyll but leaving the veins and lower epidermis intact.

497. BONDAROVICH, M. JA.

Agrotis c-nigrum—a killer of vine buds.

[Russian.]

Vinodelie i Vinogradarstvo, 1952, No. 10, pp. 47-8, illus.

A note on the damage caused in Azerbaidžan by the larvae of *A. c-nigrum* to the uppermost buds of vines in the spring. The larvae emerged from eggs overwintering on weeds, hence autumn weed destruction in vineyards is the only control necessary.

498. CLAUSEN, R., GÜNTART, E., AND HOFF-

MANN, E.

La mineuse des feuilles des arbres fruitiers

Lyonetia clerkella. (The apple leaf miner.)

Rev. hort. suisse, 1952, 52: 203-9, bibl. 8, illus.

Of the 3 generations of the apple leaf miner in Switzerland only the second was found to be of economic importance. In experiments carried out at Dielsdorf the nicotine preparation Grapol at 0.3% gave good control of the pest if timed correctly to kill the eggs and young larvae. The parathion preparation Aralo, on the other hand, checked oviposition and killed the larvae. Further studies are in progress on the timing of combined applications of 0.1% Aralo + 0.5% lead arsenate for the simultaneous control of codling moth, fruit tree red spider mite and apple leaf miner.

499. HOUTMAN, G.

Lyonetia clerkella L. [Dutch.]

Fruiteelt, 1952, 42: 541-3, illus.

The occurrence in the Netherlands of two apple leaf miners, *Nepticula malella* and *Lyonetia clerkella*, is mentioned. The latter is here described with notes on its life-history, habits and damage caused. Chemical and biological control methods are discussed.

500. SNAPP, O. I.

Treatment of peach nursery stock to prevent infestation by peach tree borer.

J. econ. Ent., 1952, 45: 546.

Benzene hexachloride and DDT sprays for peach tree borer.

Ibidem, 1952, 45: 547.

Two notes are given showing that sprays containing 8 lb. of wettable powders of either 6% γ -isomer BHC or 50% DDT per 100 gal. gave an appreciable reduction of peach tree borer, *Sanninoidea exitiosa*, infestation in Georgia.

501. GEIER, P., AND SAVARY, A.

Expériences récentes dans la lutte contre les vers de la grappe (Eudémis et Cochylys).

(Recent trials on the control of grape berry moth and cochylys on vine.)

Rev. romande Agric. Vitic., 1952, 8: 25-6.

In 1951 the effect of parathion, DDT and Nirosoan on two generations of cochylys (*Clysia ambiguella*) and

grape berry moth (*Polychrosis botrana*) was again compared in vineyards at 6 localities. Parathion at 0.1%, with a steady kill of almost 100% for three years running, was the most reliable of these insecticides and it was not affected by the variation of environmental factors in different seasons. DDT 50% at 0.2%, although generally satisfactory, had the drawback that it required exact timing. Concentrated and ordinary Nirosoan at 0.2% and 1% respectively were slightly less effective than DDT, but this chemical has the advantage that its action is specific. Concentrated Nirosoan is preferable to the ordinary formulation as it leaves the grapes clean.

502. MAXWELL, C. W., AND MORGAN, G. T.

Life-history studies of the cranberry fruitworm, *Mineola vaccinii* (Riley), in New Brunswick (Lepidoptera; Pyralidae).

82nd A.R. ent. Soc. Ontario 1951, 1952, pp. 21-5, bibl. 8, being *Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa 2935*.

Comparison of data on the life-history of the cranberry fruitworm with those on cranberry development indicated that the initial application for control should be made immediately after the peak of blossoming, when the first eggs of the insect have hatched. [From authors' summary.]

503. GÖTZ, B.

Die Bekämpfung der Gallicolen von *Phylloxera vitifolii* Fitch. (The control of gall forming *Phylloxera vitifolii*.) [English summary 1/4 p.]

Z. PflKrankh., 1952, 59: 189-98, bibl. 11, illus.

The gall producing form of *Phylloxera vitifolii* is important not for the direct damage it produces but because it accelerates the spread of the pest. Spraying against the winter eggs has proved to be the best control and is prescribed by law in Germany. The relative effectiveness of DDT, Hexa and "E" preparations and of the systemics Systox and Pestox are described. Economically the gamma preparations are preferable because nearly normal concentrations are successful, while the systemics need relatively high concentrations.—Staatl. Weinbauinst., Freiburg i Br.

504. EGOROV, P. I.

Methyl bromide for the control of phylloxera.

[Russian.]

Vinodelie i Vinogradarstvo, 1952, No. 7, p. 46.

In laboratory trials at Odessa 2 hr. fumigation with methyl bromide at the rate of 20 g. per m³ killed phylloxera in all stages of its development (including eggs) without affecting the roots of vines.

505. PRINC, JA. I.

Growing vines on their own roots in regions attacked by phylloxera. [Russian.]

Vinodelie i Vinogradarstvo, 1952, No. 6, pp. 41-4.

Vine varieties grown on their own roots, particularly those exhibiting a certain amount of resistance to phylloxera, are stated to be more productive than when grafted, and this method of cultivation is recommended for some southern states of the Soviet Union, since the effective control of phylloxera by fumigation is now

possible. Dichlorethane at the rate of 100 g. per sq. m. and polychloride at 20 g. per sq. m. are recommended for spring application; for autumn treatments somewhat higher rates are suggested. Reference is also made to the favourable effects of these fumigants on the growth and yield of vines.

506. PETROSJAN, F. G.

Testing new preparations against phylloxera.

[Russian.]

Vinodelie i Vinogradarstvo, 1952, No. 8, pp. 39-41.

Of the fumigants tested in Armenia dichlorethane and dichloride applied in the spring or autumn at the rate of 100 g. per sq. m. gave 94-100% control of phylloxera without affecting the roots of the vines. In similar treatments made during the summer months dichloride was found equally effective but dichlorethane gave only 50% control.

507. WHITNALL, A. B. M., AND WINSTANLEY, J. K.

The control of mealybugs on vines with chemicals.

Plant Prot. Overs. Rev., 1952, 3 (2): 21-4.

Parathion sprays and dusts have replaced hydrocyanic acid for the control of the 2 species of mealybug, *Pseudococcus maritimus* and *P. citri*, which occur on vines in the Hex River valley, one of the chief table grape areas in South Africa. Present recommendations for mealybug control on vines are a winter spray of 10 gal. 32% lime-sulphur per 90 gal. water followed in early summer by either a dusting with 2% parathion-in-sulphur or a spraying with about 0.03% parathion and, if necessary, another after 10 days. Parathion should not be applied if infection is only slight. If all mealybugs are killed their numerous predators and parasites (whose presence is necessary to assist with any big future mealybug outbreak) will all be killed too, either by the chemical poison or the absence of food.

508. COTTIER, W., HARRISON, R. A., AND JACKS, H.

Control of the grapehouse mealybug (*Pseudococcus maritimus* Ehr.).

N.Z. J. Sci. Tech., Sect. A., 1952, 34: 266-76.

Pending further work on minimum effective dosages, it is considered that the following programme will give good control: An application of 1% DDT spray to the vines during the dormant season as near as possible to bud-burst period, followed by one or more treatments with 2% DDT dust as required, but no dusting to be made after the thinning period. Because of possible harmful residues, the number of dustings should be kept to a minimum. [From authors' conclusions.]

509. SYLVÉN, E.

Syrastekeln och dess bekämpning. (The dock sawfly and its control.)

Växtskyddsnotiser, 1952, No. 3, pp. 35-9, illus.

In recent years the dock sawfly, *Ametastegia glabrata*, has become a troublesome pest in certain areas of southern Sweden, causing a loss of 10% of the apple crop. Spraying the bottom of the stems and the ground area around them with a mixture of pyrethrum and DDT in the early autumn of 1950 proved unsatisfactory. In properly laid-out trials carried out between

16 and 23 August, 1951, treatment of all the weeds in the orchard with thiophosphor or a mixture of DDT, BHC and other insecticides reduced the number of larvae on the test plants from over seventy to three.

510. MAY, A. W. S.

The grape scale.

Qd agric. J., 1952, 75: 105-7, illus.

Recommendations are made for the control of *Eulecanium persicae* by dormant or semi-dormant oil sprays and, where necessary, by summer spraying with white oil (1-40) at the partial expense of mildew control.

511. MASTEN, V.

Problem suzbijanja kaliforniske štiteaste vaši kod nas. (The problem of San José scale control in Yugoslavia.) [English summary 1½ p.]

Zasht. Bilja, Belgrade, 1951, No. 8, pp. 76-92.

San José scale, *Aspidiotus perniciosus*, is a serious economic pest in Yugoslavia and constitutes a particular danger for Slovenia where 4 million, or about half of the existing fruit trees, are infested by it. In trials conducted at Maribor since 1948 a number of chemicals, notably commercial preparations containing tar oil, mineral oil or dinitro-ortho-cresol applied in the winter and DDT and parathion used in the summer, gave excellent control. Nevertheless the insect appears to be as prevalent throughout the orchards as ever, and the reasons for this, mainly technical and economical, are discussed at some length.

512. ASTELARRA, L. P., AND ROTHLIN, R. E.

Aparición y difusión del psílido del peral (*Chermes pyricola* F.) en el alto valle del Río Negro y Neuquén. (The occurrence and spread of pear sucker (*Chermes pyricola* F.) in the upper valley of the Río Negro and Neuquén [Argentina].)

Idia, 1952, 5 (55): 1-5, bibl. 10, illus.

The pear sucker first appeared in the Río Negro Valley, Argentina, in 1949 and by 1952 it had spread to all parts of the valley and was causing alarming damage. Trees became debilitated, shoots died and leaves and fruit were covered with a honey dew and sooty mould. Five generations were recorded in a year, the first one starting in late September. Extensive preliminary trials were carried out for its control. DDT, kerosene emulsion and nicotine sulphate were ineffective; DDT+summer oil caused damage to the trees; rotenone gave fair control; BHC preparations gave good control but could not be used within 35 days of harvest for fear of taint. The best control and longest residual effect was given by the ester of nitrophenoldialcoxithiophosphoric acid at 46.6%, which was best applied 1 month before harvest. The trials are being continued.

513. WEIDNER, L.

Libelleneiablage an Apfelbaumzweigen. (Oviposition by dragonflies on apple twigs.)

Z. PflKrankh., 1952, 59: 277-8, bibl. 10, illus.

Damage to apple shoots from blisters caused by the egg-laying of the dragonfly *Lestes viridis* is described, with a brief account of the habits of the insect as a pest of woodland- and fruit-trees. The oviposition is usually on branches which overhang water.

Antibiotics.

514. BRIAN, P. W.

Antibiotics as systemic fungicides and bactericides.*Ann. appl. Biol.*, 1952, 39: 434-8, bibl. 14.

Experiments with griseofulvin, a metabolic product of 3 species of *Penicillium*, including *P. nigricans*, which is very commonly found in soil, particularly in acid soils, showed that it is taken up by plants in general and is a fairly effective systemic insecticide. Since it is micro-biologically degraded in fertile soils with some rapidity it might be uneconomical to apply it to the soil even if it could be produced very cheaply. Entry through the leaves would almost certainly be less effective. Means are being studied of inducing the appropriate organism to synthesize it in the rhizosphere of the plants which it is desired to protect. Mention is made of the American conception of a kind of chemotherapeutic treatment of plant disease as "antidoting the toxins produced by the parasitic fungus".

515. MACDONALD, R. E., AND BISHOP, C. J.

Phloretin: an antibacterial substance obtained from apple leaves.*Canad. J. Bot.*, 1952, 30: 486-9, bibl. 10.

A crystalline antibacterial substance isolated from apple leaves has been identified as phloretin. It has been shown to inhibit the growth of a number of Gram-positive and Gram-negative bacteria. The activity of the compound is bacteriostatic in nature and is shown in concentrations as low as 30 p.p.m. Its antibacterial action may be related to inhibition of the uptake of phosphorus by the bacterial cell. [Authors' abstract.]—Acadia University, Wolfville, N.S.

516. GROSSBARD, E.

Antibiotic production by fungi on organic manures and in soil.*J. gen. Microbiol.*, 1952, 6: 295-310, bibl. 31, illus.

The soil is the natural habitat of most of the micro-organisms which produce antibiotics when grown in laboratory culture media. Some antibiotics inhibit *in vitro* the germination of fungal spores and the growth of certain fungal plant pathogens. This paper deals with antibiotic production by soil fungi, especially *Penicillium patulum*, cultivated on organic materials which are or could be used as manures, and in soil to which various carbohydrates were added. The ultimate object of the work is to determine whether the formation of antibiotics in natural soil by fungi is possible and whether this can be an important factor in the control of certain root diseases by organic manuring.

Fungicides.

517. PIERI, G.

Nuovi anticrittogamici sperimentati nel 1951. (New fungicides tested in 1951.)[English summary $\frac{1}{2}$ p.]*Ann. Sper. agrar.*, 1952, 6: 1027-42.

In tests at Conegliano Viticultural Experimental Station attention was directed towards economy in the use of Cu for vine mildew control, and comparing wettable colloidal sulphur with volatile sulphur in oidium control. *Peronospora control*: 2 products of low copper content (cuprobentonite) were moderately efficacious

and 2 others gave negative results; the 2 non-copper products tested (dimethyl-dithiocarbamate of Fe and Zn) were less efficacious than bordeaux mixture; bordeaux mixture of reduced concentration with added adhesive gave satisfactory results. *Oidium control*: wettable sulphur was efficacious and in some cases superior to volatile sulphur.

518. THIOLLIÈRE, J.

L'éthylène bis dithiocarbamate de zinc ou Zineb, nouveau fongicide de synthèse.**(Zineb, a new synthetic fungicide.)***Pomol. franç.*, 1952, 79: 73-6.

Experimental spraying of Passe Crassane pear trees against scab with zineb, consisting of 5 applications (one pre-floral, 2 post-floral, 2 fruit) at 0.2-0.3%, and with Cu oxychloride at 0.2-0.5% gave 72% and 69-88% clean fruit respectively. In another test with zineb at 200 g. per hl. compared with 0.3% Cu oxychloride for the first treatments followed by 0.3% zineb, 64% and 76% clean fruit were obtained. In experiments with Belle de Boskoop apples zineb also gave as good protection against scab as Cu oxychloride.

519. FÜRST, H.

Untersuchungen über die Wirkungen von hochmolekularen organischen Stoffen als Spritzmittel gegen Rostpilzinfektion. (Tests on the action of high molecular organic compounds as spray materials against rust infection.)*Phytopath. Z.*, 1952, 19: 48-55, bibl. 19.

The action is described of a new group of chemicals, compounds of pyridine and quinoline, against certain rust fungi, including those of mint (*Puccinia menthae*), snapdragon (*P. antirrhini*) and asparagus (*P. asparagi*). They were found to hinder the germination of the uredospores and the initiation of infection. Used alone they scorched the plants, but the addition of sulphite lye prevented injury. A compound of N-methyl-tridecyl-pyridinium-methosulphate (0.25%) with sulphite lye prevented rust infection of peppermint. It was also effective against the downy mildew of vine, *Plasmopara viticola*.

Pest control methods and materials.

520.* ROSS, W. A.

Harmonizing chemical with biological control of orchard insects.[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 3.

Attention is called to the possibilities of modifying the orchard spray schedule so that to a greater or less degree it will supplement or at least will not work at serious cross-purposes with the natural enemies of insects and mites. Harmonizing chemical with biological control necessitates research on pest species and their biotic controls and the effects of chemicals on them; and on the interrelations of phytophagous species and the effects of chemicals on these interrelations. The desideratum in combined chemical and biological control appears to be a programme that will not have too drastic an action on certain phytophagous species as well as on natural enemies but will result in a more or less balanced fauna. [Author's summary.]

* See note, p. 3.

521. AUSTRALIA DEPARTMENT OF HEALTH (MERTIN, J. V.).
Pesticides Quarterly Supplement.
Pesticides quart. Suppl. Commonw. Aust. Dep. Health, 1952, No. 2, pp. 139-74, bibl. 70.

Recent literature on the effects of insecticides, fungicides and herbicides on man and animals is reviewed. Administrative measures concerning the use of these compounds in various parts of the world, protective respiratory equipment, and the chemical determination of residues are discussed. [See also *H.A.*, 22: 2445.]

522. KIMURA, J.
Methods of applying insecticides and fungicides and the control of some important insects. [Japanese, English summary 4 pp.]
Aomori Apple Ass. Ser. 17, 1952, pp. 53.
Apple spray chart 1952. [Japanese, with English summary 10 lines.]
 (Publ.) *Aomori Apple Exp. Stat.*, 1952, chart.

The object of the booklet is to amplify the brief spray schedule issued annually and thus enable growers to adapt it to their individual requirements and carry out its prescriptions efficiently. A translation is provided of the current schedule which covers some 23 pests and diseases.

523. FUKUDA, J., AND YOKOZAWA, Y.
On the effectiveness of organic insecticides on the injurious insects of various fruit trees. [Japanese, with English summary $\frac{1}{2}$ p.]
J. hort. Ass. Japan, 1952, 21: 3-12, being *Mem. Tokai hort. Exp. Stat.* 11.

Experiments at Tokai-Kinki Agricultural Experiment Station showed that: (1) control of the persimmon fruit moth (*Kakivoria flavofasciata*) is obtainable with both DDT and lead arsenate, the former being more effective with bentonite and kaolin than with other carriers; (2) small infestations of peach trees by the oriental fruit moth (*Grapholitha molesta*) and the leaf hopper (*Erythria zonata*) can be controlled by spraying with DDT, but an increase in red spider mites results; (3) spraying with DDT, BHC or chlordane does not give effective control of the oriental fruit moth on pear trees or of the fruit moth (*Dichocrocis punctiferalis*) on peach trees; (4) spraying with DDT emulsion has no effect on *Ceroptastes rubens* larvae but gives some control of overwintering adults. DDT and light oil emulsion is more effective against the latter than DDT alone. (5) BHC with pyrethrum mixed is a useful substitute for nicotine sulphate against the citrus leaf miner (*Phyllocnistis citrella*).

524. FRINGS, H.
Factors determining the effects of radio-frequency electromagnetic fields on insects and materials they infest.
J. econ. Ent., 1952, 45: 396-408, bibl. 35, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1717.

In trials conducted at Pennsylvania State College, fruits and vegetables were heated and insects were killed when placed in radio-frequency (3-27 Mc./sec.) electrostatic fields. It is probably impossible to heat any insect inside a fruit or vegetable without heating the plant material also. In the present state of knowledge the study of possible practical utilization of RF fields for

insect control remains chiefly empirical. [From author's summary.]

525. ANON. (VERSICOL CORPORATION).
Properties and effectiveness of Heptachlor.
Agric. Chemls., 1952, 7(9): 35-7, 125-6.

The list of insects which are controlled by 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4, 7-methanoindene includes many pests of fruit and other horticultural crops. Detailed instructions for application are given and general properties are discussed.

526. FUKUDA, J.
On the toxicity of DDT and BHC to the aphids and lady beetle of pear trees. [Japanese, with English summary 14 lines.]
J. hort. Ass. Japan, 1952, 21: 1-2, being *Mem. Tokai hort. Exp. Stat.* 12.

BHC was more toxic than DDT to the aphids, *Toxoptera piricola* and *Nippolachnus piri*, and less so to the various stages of the lady beetle, *Harmonia axyridis*, their natural enemy, in laboratory tests.

527. SCHRADER, G.
Die Entwicklung neuer Insektizide auf Grundlage organischer Fluor- und Phosphorverbindungen. (The development of new insecticides based on organic fluorine and phosphorus compounds.)
Höfchen Briefe, 1952, 5: 45-57, bibl. numerous.

The article is an abstract by the author of his original paper (*Monogr. angew. Chem. Ing. Tech.* 62, 1951) in which he discusses his own work and that of his collaborators during the last 15 years.

528. ANON.
Metacide—a new organic phosphate insecticide.

Down to Earth, 1951, 6 (4): 11.

Metacide, the toxic portion of which is mostly 0,0-dimethyl-0-p-nitrophenyl thiophosphate, showed, during field tests in 1950, excellent promise as a general insecticide, and to some extent as a miticide. The pests controlled included a number injurious to fruit trees. It was equal to parathion for the control of eye-spotted bud moth, plum curculio and red-banded leafhopper, but gave inferior mite control. It is less toxic to warm blooded animals than parathion.

529. BOSSE, G. H. C.
Versuche mit einem neuartigen Schädlingbekämpfungsmittel im Gartenbau. (Trials with a new insecticide against horticultural pests.)
Höfchen Briefe, 1952, 5: 81-9.

In small-scale tests the new systemic insecticide Systox (composition not specified) proved effective against the following pests of ornamental plants: aphids, red spider (*Tetranychus pilosus*), chrysanthemum eelworm, and thrips. Successes are also reported against red spider on apple, apple leaf miner and *Hyalopterus arundinis* on peach. The chemical proved to be active for at least 10 days in herbaceous plants and for up to 4 weeks in fruit trees. Plant injury has not been encountered, even at high concentrations.—Gärtner. Versuchsanst. Friesdorf (Bad Godesberg).

530. HAMILTON, D. W., AND OTHERS.

Control of pests attacking apples, peaches, and pears with nitroparaffin compounds.

J. econ. Ent., 1952, 45: 462-6, bibl. 1.

Experimental insecticide formulations containing CS-645A, CS-674A and CS-708 (a mixture of the two), tested during the past 3 years, have repeatedly given adequate control of codling moth, plum curculio, red banded leaf roller, oriental fruit moth, and pear psylla, and inadequate control of European red mite, two-spotted spider mite and apple aphid. Sprays containing CS-708 also failed to control the tarnished plant bug and pentatomids causing catfacing on peaches, although their use resulted in nearly as great a reduction in this type of injury as resulted from aldrin plus DDT, parathion and other organic insecticides. Both emulsions and powder formulations of CS-708 were found compatible with 2 acaricides and 3 fungicides without causing visible injury to fruit or foliage. [From author's summary.]

531. ANDERSON, L. D., AND TUFT, T. O.

Toxicity of several new insecticides to honey bees.

J. econ. Ent., 1952, 45: 466-9, bibl. 12, being *Pap. Calif. Citrus Exp. Stat.* 717.

In laboratory toxicity tests applications of malathion, parathion, BHC, EPN and lindane resulted in 100% kill of bees within a few minutes. Some compounds, including aramite and 2,4-dichlorophenyl benzene sulphonate, and diluents such as calcium carbonate, magnesium carbonate and hydrated lime, were relatively non-toxic. Field observations showed that parathion treatments caused poisoning of bees and honey in the hives. [From authors' summary.]

532. CONRADIE, W. J.

The undesirability of using D.N.O.C. compounds for fruit spraying in the Ceres area.

Decid. Fruit Gr., 1952, 2(7): 15.

The rest-breaking properties of DNC can be detrimental in the cold Ceres area through blossom, induced to open early, suffering frost damage. Cover crops are damaged and checked more or less severely and sometimes entirely destroyed by DNC. The disadvantages of DNC outweigh the advantages in Ceres and its use is not advised.—W. Prov. Fruit Res. Stat., Stellenbosch.

533. CRAGG, J. B., AND VINCENT, M. H.

The action of metaldehyde on the slug *Agriolimax reticulatus* (Müller).

Ann. appl. Biol., 1952, 39: 392-406, bibl. 7.

The mode of action is discussed. Without detailed investigation the use of metaldehyde on edible crops would be inadvisable but it could be sprayed or broadcast on other crops.

Spray application.

534. BRIZA, K.

Rezultati ispitivanja mogućnosti primene aviona u borbi protiv plamenjače na vinovoj lozi u 1950 god. (Results of investigations on the possibility of using aeroplanes for downy mildew control in vineyards in 1950.) [English summary 1½ pp.]

Zashit. Bilja, Belgrade, 1951, No. 6/7, pp. 105-18, illus.

Trials conducted in Yugoslavia in 1950 have shown that downy mildew [*Plasmopara viticola*] can be controlled by aeroplane treatment. When comparing aeroplane applications of bordeaux mixture with the conventional hand spraying it was found that hand spraying provides a better copper residue and consumes less material, but aeroplane application is only about half as expensive and six times as fast. Best results with aeroplane treatment were obtained when the leaves of vines were still damp and the atmosphere was humid.

535. JORDOVIĆ, M.

Downy mildew control by aircraft in 1951.

[Serbian, English summary ¾ p.]

Zashit. Bilja, Belgrade, 1951, No. 6/7, pp. 119-25.

Results from several vineyards sprayed with bordeaux mixture from aeroplanes show that the efficiency of the application was satisfactory on young, small vines, but aeroplane treatment of tall, fully grown vines needs supplementing by hand spraying.

536. KUŠČAK, L. I.

Aeroplane treatment of vineyards with copper chlorate preparations. [Russian.]

Vinodelie i Vinogradarstvo, 1952, No. 7, pp. 43-5.

Data presented show that a copper chlorate preparation applied from an aeroplane either as dust or spray was more effective for the control of vine mildew than bordeaux mixture similarly applied.

537. TOMINIĆ, A.

Upotreba aviometode u suzbijanju maslinove muhe kod nas. (The use of aeroplanes against *Dacus oleae*.) [English summary 1 p.]

Zashit. Bilja, Belgrade, 1951, No. 6/7, pp. 141-52, bibl. 5.

Aeroplane applications of DDT for the control of olive fly along the Adriatic coast of Yugoslavia in June and early July of 1951 were, for technical reasons, not very successful. Conditions of infestation and methods of control used in southern Italy are compared with those in Yugoslavia, and the reasons for the unsuitability of Italian methods are discussed. The future organization of olive fly control, based on aeroplane treatment of sources of infestation, is outlined.

538. ŽIVOJINOVIĆ, S.

The rôle of aircraft in gypsy moth control in 1947-1950. [Serbian, English summary 2 pp.]

Zashit. Bilja, Belgrade, 1951, No. 6/7, pp. 42-63, bibl. 7, illus.

A very heavy gypsy moth [*Porthetria dispar*] infestation in Yugoslavia, particularly in Serbia, Bosnia and Croatia, starting in 1945 culminated in 1948, calling for nation wide organization of control. It is shown that during the winter of 1948-49 nearly 28 million fruit trees and about 840,000 ha. of deciduous forests were infested. Limited use of aeroplanes for spraying against gypsy moth had been made in 1947, but the main operations, described in detail with maps showing the infested areas, were carried out from 1948 to 1950. Kerosene and various oil emulsions were applied against overwintering eggs, and lead arsenate and DDT against the caterpillars. Infested woodlands and nearby

orchards were sprayed with DDT from aeroplanes, for which purpose "Aero 2" was found the most suitable machine available.

539. ANON.

Low-volume spraying in orchards.

Farm Mech., 1951, 3: 98-9.

The costs of high-volume and the estimated much lower costs of low-volume spraying are compared. Problems that face low-volume spraying are: (1) the production of a fine spray; (2) adequate control of concentration and dosage rate; (3) complete and uniform coverage; and (4) the effects of wind.

540. BESKINE, J. M.

The use of the low-volume mist blower.

World Crops, 1952, 4: 338-43, illus.

Factors involved in the practices of drift spraying for field and some plantation crops and blast spraying for orchards are discussed with the aid of diagrams.

541. TUKEY, L. D., AND WILLIAMS, O.

A versatile sprayer for experimental purposes.

Proc. Amer. Soc. hort. Sci., 1952, 59: 343-8, illus., being *Pap. J. Ser. Pa agric. Exp. Stat.* 1704, 1951.

The small sprayer described is attached to the side of a Speed Sprayer and replaces the liquid system of the large unit. By operating the Speed Sprayer solely for its air blast small quantities of 50 gal. or less of concentrate sprays or growth substances can be applied experimentally under conditions which simulate those of commercial practice. The small sprayer can also be detached and used as an independent unit for conventional spraying.

Spray residues and damage.

542. CLARK, P. J., AND OTHERS.

DDT and arsenic residues on fruit.

N.Z. J. Sci. Tech., Sect. A, 1952, 34: 209-12, bibl. 3.

Tomatoes, beans and apples were sprayed with 0.1% and 0.05% wettable DDT, 0.1% DDT emulsion or 0.3% and 0.15% lead arsenate and were harvested at varying periods after the final spray treatment. In no case was the DDT residue above 7 p.p.m., but arsenic trioxide residues on tomatoes and beans were mostly above the permitted limit of 1.5 p.p.m. DDT residues on tomatoes decreased significantly with time from the final spraying, but this was not the case with apples up to 28 days after spraying.

543. FORD, O. W., AND BURKHOLDER, C. L.

Mercury spray residues—their estimation on apples at harvest time.

Agric. Chemls, 1952, 7 (7): 44-7, 123, bibl. 5.

Using di-beta-naphthylthiocarbazone reagent, mercury residue on apples was determined in amounts as low as a few parts per billion [U.S.] when an adequate size sample of fruit was taken for analysis. Results of two years' orchard experiments indicate that factors other than rain tend to dissipate the mercury residue on the fruit. [Authors' summary.]—Purdue Univ., Lafayette, Indiana.

544. VIEL, G., HASCOET, M., AND DUCLOS, M. Semi-microméthode par molybdomanganimétrie pour le dosage des dépôts laissés sur les végétaux par les composés zinciques. (A semimicro-method for the determination, by a molybdomanganimetric method, of zinc residues on plants.)

Ann. Épiphyt., 1952, 3: 273-80, bibl. 14.

Methods which have been used for the determination of zinc residues on plants after the application of such fungicides as zinc ethylene-bis dithiocarbamate are discussed. The relatively simple method here described allows small amounts of zinc to be determined to about 10% accuracy, when the zinc is present with organic matter or is part of an organic molecule.

545. ULBRICH, M., AND SALLER, W.

Gärhemmungen durch Spritzmittel? (Do sprays inhibit fermentation [of vine must]?) [English summary 4 lines.]

Mitt. Klosterneuburg, 1952, 2: 164-9, bibl. 3.

An over-dose of lime-sulphur inhibited fermentation, while an over-dose of parathion had only a slight effect.

546. SCHUCH, K.

Über die Schädigung von lagerndem Obst durch ein bifluoridhaltiges Holzschutzmittel. (Damage to stored fruit by a wood protectant containing bifluorides.)

Nachr. Bl. dtisch. PflSch Dienst., Braunschweig, 1952, 4: 136-7.

Damage to fruit, in stores where the woodwork had been treated with bifluoride preparations, particularly a proprietary substance known as "Osmol WB4", was attributed to the effect of the fluoride fumes, and this was confirmed experimentally. The storage of fruit in chambers so treated should be avoided or an interval allowed to elapse after treatment, but what constitutes a safe interval has yet to be determined.

Noted.

547.

a CROWDY, S. H.

The chemotherapy of plant disease.

Emp. J. exp. Agric., 1952, 20: 187-94, bibl. 38.

b DEPARTMENT OF AGRICULTURE FOR SCOTLAND.

Raspberry diseases in Scotland.

Adv. Leaf. Dep. Agric. Scot. 7, revised 1952, pp. 9, illus., 9d.

The section on virus diseases has been revised and a note added on botrytis stem rot.

c EMERY, G. A.

A new summer ovicide for red spider.

World Crops, 1952, 4: 319-21, bibl. 6, illus. Parachlorophenyl benzene sulphonate (PCPBS).

d

HEE, O. Foreløbig meddelelse om undersøgelser over ferskenlusens overvintring i Danmark. (A preliminary communication on the hibernation of the green peach aphid in Denmark.) [English summary ¾ p.]

Tidsskr. Planteavl, 1952, 55: 346-60, bibl. 15.

- e JACKS, H.
Compatibility of spray materials used in New Zealand on apricots.
[Publ.] *D.S.I.R., N.Z.*, Auckland, 1952, one chart.
- f JACKS, H.
Compatibility of spray materials used in New Zealand on peaches—1952.
[Publ.] *D.S.I.R., N.Z.*, Auckland, 1952, one chart.
- g JACKS, H.
Compatibility of spray materials used in New Zealand on pears.
[Publ.] *D.S.I.R., N.Z.*, Auckland, 1952, one chart.
- h KIMURA, J.
Control of red mite on apple. [Japanese, English summary 1 p.]
[Publ.] *Aomori Apple Exp. Stat.*, 1952, pp. 37.
- i KRASILJNIKOV, N. A.
The use of antibiotics in plant cultivation. [Russian.]
Priroda, 1952, No. 7, pp. 17-27, illus.
- j KRSTIĆ, M.
Chestnut canker (*Endothia parasitica*)—a current European problem. [Serbian, French summary $\frac{1}{2}$ p.]
Zasht. Bilja, Belgrade, 1951, No. 8, pp. 41-9, bibl. 6.
- k LEHMANN, P.
Eingriffe in den Wärmehaushalt oberirdischer Pflanzenorgane. (Influencing the heat balance of plant organs above ground.)
Ber. dtsh. Wetterdienst. U.S. Zone 32, 1952, pp. 67-70.
Frost protection methods, their merits and their action.
- l LINKE, W.
An investigation of the biology and the epidemiology of the common red spider, *Tetranychus althaeae* v. Hanst.
Höfchen Briefe (English edition), 1952, 5: 19-20.
- m MINISTERIE VAN LANDBOUW, NETHERLANDS.
De Amerikaanse kruisbessenmeeldauw. (American gooseberry mildew.)
Vlugschr. PlZiekt. Dienst Wageningen 39, 1952, pp. 4, illus.
- n MINISTRY OF AGRICULTURE, LONDON.
Peach leaf curl.
Adv. Leaf. Minist. Agric. Lond., 81, 1952, pp. 3, illus., 2d.
- o MINISTRY OF AGRICULTURE, LONDON.
Raspberry beetle. [*Byturus tomentosus*].
Adv. Leaf. Minist. Agric. Lond. 164, 1952, pp. 3, 2d.
- p MITIĆ, N.
Incidence of San José scale in Yugoslavia. [Serbian, English summary $\frac{1}{2}$ p.]
Zasht. Bilja, Belgrade, 1951, No. 8, pp. 72-5.
- q MÜLLER, F. P.
Der jahreszeitliche Massenwechsel der grünen Pfirsichblattlaus (*Myzodes persicae* Sulz.). (Seasonal changes in the mass incidence of the green peach aphid.)
NachrBl. dtsh. PflSchDienst, Berlin, 1952, 6: 28-32, bibl. 17.
- r* RICH, S., HORSFALL, J. G., AND KEIL, H. L.
The relation of laboratory to field performance of fungicides.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 5, bibl. 20.
- s SUMMERS, F. M., AND BAKER, G. A.
A procedure for determining relative densities of brown almond mite populations on almond trees.
Hilgardia, 1952, 21: 369-82, bibl. 5.
Bryobia praetiosa.
- t THORSRUD, J.
Tåkesprøyting i frukthagen. (Orchard spraying by mist blowers.)
Frukt og Baer, 1952, 2: 73-7, illus., being *Meld. Stat. Forsøksk. Kise 2*.
- u THRAN, P.
Ertragssteigerungen durch den Windschutz der Wallhecken (Knicks) in Schleswig-Holstein. (Increases in yield from wind protection by hedges.)
Ber. dtsh. Wetterdienst. U.S. Zone 32, 1952, pp. 57-9.
- v VERONA, O.
Intorno alla presenza nelle zone del litorale Toscano di malattie dei fruttiferi ad eziologia incerta. (Some non-fungal diseases of uncertain etiology of fruit trees on the Tuscan coast.) [English summary 4 lines.]
Ann. Sper. agrar., 1952, 6: 615-22, bibl. 11, illus.
- w WASON, S. R.
The protection of soft fruits against birds.
Fruit Year Book, 1953, 1952, pp. 78-83, illus.
Types of fruit cage are discussed.

* See note, p. 3.

WEEDS AND WEED CONTROL.

General.

(See also 66, 661, 1100.)

548. MOORE, R. M.

Weeds research in Australia.*Abstr. News Summ.* A.R.C. Sect. C. Herbicides*, 1952, No. 5, pp. 27-34, bibl. 63.

A list is given of the major weeds of Australia, which shows that introduced plants predominate. The rest of the paper comprises a review of the literature on general weed control problems, and on the control of annual, biennial and perennial weeds, woody plants and aquatic weeds. Reference is also made to biological control.

549. NICKELL, L. G.

454 weeds and how to control them.*Brooklyn bot. Gdn Rec.*, 1952, 8: 58-100, bibl. 130.

This useful compilation, based on the results of recent work, presents the following information in tabular form: scientific name of weed, common name, compounds used to eradicate or control it, remarks on formulation, time of application, etc., and references to the literature. To assist in identifying weeds an alphabetic list is appended of common names with the generic names attached.

550. KAUL, R. N., AND RAHEJA, P. C.

A review on weeds and their control.*Sci. and Cult.*, 1952, 18: 124-9, bibl. 38.

This review on the damage to crops caused by weeds, the delayed germination of weed seeds and methods of controlling weeds includes a list of 28 species with their vernacular names that are major weeds in India.

551. MARTINEZ CROVETTO, R., AND PICCININI, B. G.

Bibliografía argentina sobre malezas. (Argentinian bibliography on weeds.) [German summary 6 lines.]

Lilloa, 1949, 18: 211-12 [received 1952].

The authors, of the Institute of Botany [Buenos Aires], have compiled a bibliography of 695 references to the Argentinian literature on weeds published up to December 1946. The bibliography is not published here.

552. THORNTON, B. J.

Classification of perennial herbaceous weed crop responses to herbicides.*Res. Progr. Rep. 13th west. Weed Control Conf.* Reno, Nev., 1952, pp. 32-43.

The responses of some 70 weeds to 12 herbicides are shown in the tables. Of crop responses, only those of herbage plants are given.

553. MYERS, L. F., AND MOORE, R. M.

The effect of fertilizers on the winter weed population.*J. Aust. Inst. agric. Sci.*, 1952, 18: 152-5.

A point quadrat analysis was made of a winter weed population in a citrus experimental orchard at Griffith, in which N, P and K had been applied, singly and in combination, since 1924. The area was irrigated and cultivated in summer and left undisturbed in winter.

* Prepared by the Agricultural Research Council Unit of Experimental Agronomy, London, being mainly abstracts of interim reports.

In the N-only plots the only weed to show a marked increase was capeweed (*Cryptostemma calandula*) which was common throughout the area. Where N and P were applied together, grasses predominated. Where P was applied without N, burr medic (*Medicago denticulata*) was the main species present. K had no significant effect on weed population.

554. TERRY, C. W.

Experimental mechanical equipment for application of weed control chemicals.*Proc. 6th annu. Mtg N.E. Weed Control Conf.* 1952, New York, pp. 3-5, bibl. 4.

The apparatus briefly described are: nozzle tester, sprayer for small plot work, laboratory spray apparatus and stem spray applicator.

Particular weeds.

555. THORNTON, B. J., AND OTHERS.

Broadleaf perennial weeds.*Res. Progr. Rep. 13th west. Weed Control Conf.* Reno, Nev., 1952, pp. 1-15.

Among 19 reports involving the control of 8 weeds, 6 deal with Canada thistle, *Cirsium arvense*. In an apple and pear orchard 2 lb. per acre of the sodium or amine salt of 2,4-D applied in the spring and autumn for 4 years practically eliminated the weed without injuring the trees. In a cherry orchard a combination of 2,4-D treatment and cultivation gave very good control of field bindweed, *Convolvulus arvensis*, again without affecting the trees. The other weeds discussed are Russian knapweed, leafy spurge, white top (*Cardaria draba*), poverty weed (*Franseria discolor*), biscuit root (*Lomatium leptocarpus*), and wild onion (*Allium acuminatum*).

556. MACRAE, J. W.

The increase of dodder and suggestions for its control.*Proc. 5th Mtg east. Sect. nat. Weed Cttee* 1951, Quebec, 1952, pp. 80-1.

Field or clover dodder, *Scuscuta campestris*, and swamp dodder, *C. gronovii*, are the two species usually found in Ontario. Dodder constitutes a threat to the successful cultivation of vegetables and some fodder crops, and for its control an early ploughing of the land is recommended.

557. SMITH, J. M.

Biological control of weeds in Canada.*Proc. 5th Mtg east. Sect. nat. Weed Cttee* 1951, Quebec, 1952, pp. 95-7.

The 2 chrysomelid beetles, *Chrysolina gemellata* and *C. hyperia*, originally collected in England and France, have destroyed many thousands of acres of St. John's wort, *Hypericum perforatum*, in Australia, New Zealand and more recently in California. The establishment of these beetles for St. John's wort control in Canada, liberated for the first time in 1951, shows good promise.

558. WAGNER, J. S.

Marijuana eradication by the New York City Department of Sanitation.*Suppl. Proc. 6th annu. Mtg N.E. Weed Control Conf.* 1952, New York, pp. 119-21.

It was found that 2,4-D commonly used for the destruction of ragweed does not give satisfactory control of marijuana [Indian hemp].

559. DARROW, R. A.

Chemical control of prickly pear-cactus.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 159-61.

Summer applications of 2,4,5-T esters at 1% acid equivalent in oil were found to be generally satisfactory for the control of Engelman and Lindheimer prickly pears in Texas. [From author's summary.]

560. PEETERS, F. J.

De distels. (Thistles.)

Cult. Hand., 1952, 18: 536-7.

Notes are given on cultivated decorative thistles, and on the control of noxious species by herbicides such as Agroxone, Herbisel, sulphur, Diazyl, Hedit, and Senetox.

561. ARLE, H. F., AND OTHERS.

Perennial weedy grasses.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 16-20.

Three of the 6 reports submitted deal with quack grass (*Agropyron repens*) control. Spring and summer applications of sodium and ammonium TCA at 109, 163.5 and 218 lb. per acre proved entirely ineffective in a quack-grass infested orchard. Autumn applications gave good control of the grass throughout winter and spring, but regrowth appeared by the following June. When, however, the initial treatment was followed up by further spring and autumn applications the grass appeared to be well under control. Maleic hydrazide applied at rates of 6.66, 13.32 and 26.64 lb. per acre to Johnson and Bermuda grasses, growing along an irrigation canal, retarded growth, the duration of the effect being in direct proportion to the rates used.

562. KING, L. J.

Germination and chemical control of the giant foxtail grass.

Contr. Boyce Thompson Inst., 1952, 16: 469-87, bibl. 51, illus.

Petri dish tests revealed that the germination of giant foxtail seeds seldom exceeded 20% to 34%. Scarification of the seeds decreased rather than increased germination. Germination was increased by culturing in association with soil, by treatment with potassium nitrate and sodium thiocyanate solutions, and by alternating temperatures (21° to 37° C.) and moist storage at 21° C. The presence of germination inhibitors in the seeds was indicated by means of filter paper absorption experiments. In compact soil giant foxtail seed germinated and emerged when planted no more deeply than 3 cm., while in looser well-aerated soil they emerged from a depth of 12 cm. Alternate wetting and drying of the soil also stimulated further germination of seeds planted at several depths. It is suggested that the alternate wetting and drying process results in the partial removal, at least, of germination inhibiting substances from the seeds. Chemical soil treatment studies with the triethanolamine salt of 2,4-D, Crag Herbicide 1, dichloral urea, and CMU disclosed that each of these is effective in controlling the germination or seedling development of giant foxtail at several of the rates tested. Alternate wetting and drying of this

chemical soil treatment series disclosed that the chemicals did not prevent the dormant seed from germinating after the restoration of normal cultural conditions. In the CMU series, however, the seedlings did not survive, indicating residual action of the chemical. [From author's summary.]

563. MOORE, R. M., AND MYERS, L. F.

Trichloroacetates and other herbicides for the control of Johnson grass (*Sorghum halepense* (L.) Pers.) and couch grass (*Cynodon dactylon* (L.) Pers.).

J. Aust. Inst. agric. Sci., 1952, 18: 95-8, bibl. 5.

Several herbicides reported to be toxic to grasses were applied to old established stands of Johnson grass and couch grass. In two experiments ammonium trichloroacetate gave complete control of Johnson grass and couch grass and did not prevent the establishment of several other species four months after application. Allyl mixed chlorophenyl carbonate, isopropyl 2,4,5-trichlorophenoxyacetate, diesel distillate and lighting kerosene had no permanent effects on either Johnson grass or couch grass. In other experiments, trichloroacetates gave poor results and evidence is presented that rain, within a short period following application, may govern the herbicidal effectiveness of these compounds. [Authors' summary.]—C.S.I.R.O., Canberra.

564. REA, H. E., WOLTERS, F. A., AND ROBERTS, J. E.

Chemical control of established Johnson grass on non-cultivated land.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 108-12.

The effects of Borascu, concentrated Borascu, Polylor-chlorate, TCA, Ammate and CMU on established Johnson grass in Texas are enumerated.

565. ALBERT, W. B., HARRIS, V. C., AND LOUSTALOT, A. J.

Nutgrass.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, p. 196.

Results of 3 trials submitted individually by the authors indicate that CMU when applied at relatively high rates on ploughed land reduces the infestation of nutgrass, but does not eradicate it.

Aquatic weeds.

566. BRUNS, V. F., AND OTHERS.

Submersed aquatic weeds.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 132-9.

From the 7 reports received it appears that leafy pondweed (*Potamogeton foliosus*), sago pondweed (*P. pectinatus*), anacharis (*Anacharis canadensis*) and white water-crowfoot (*Ranunculus aquatilis*) were all effectively controlled with 444 to 600 p.p.m. (6 to 8 gal./cfs) of aromatic solvents when introduced over 30-min. periods. The more resistant species, such as the gigantic sago (*P. interruptus*), Richardson's (*P. richardsoni*), and American (*P. nodosus*) pondweeds, have been controlled with 30 min. introductions of 740 p.p.m. (10 gal./cfs) of aromatic solvents. Low concentrations of the aromatic solvents and rosin amine D acetate are reported to be effective against algae.

567. HODGSON, J. M., AND OTHERS.

Emergent aquatic weeds.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 140-4.

Three of the 4 reports submitted deal with the control of cattails (*Typha* spp.), the most troublesome weeds in this category. A combination of 4 lb. of the butoxy ethanol ester of 2,4-D and 5-10 gal. of diesel oil made up with water to 160 gal. was found the most effective spray against common cattail in Utah. In Wyoming, 3 applications of commercial herbicidal oils at 100 gal. per acre gave 90% control of Nebraska sedge (*Carex nebraskensis*).

Control of trees and shrubs.

(See also 660c, d, e, p, 1317.)

568. LEONARD, O. A., AND OTHERS.

Classification of woody plant responses to herbicides.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 71-88.

Comprehensive tables are presented on the effects of herbicides on woody vegetation, giving both names and age of plants, character of growth, soil type and aspect, type, formulation and concentration of herbicides, and degree of control.

569. SUGGITT, J. W.

The laboratory evaluation of woody plant herbicides.

Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 128-9.

About 210 phenoxyacetic-type herbicides are available in Canada of which the ester formulations are suitable for the control of woody plants. Methods of chemical and physical analyses of these herbicides are briefly outlined.

570. BUTLER, C. C., AND OTHERS.

Undesirable woody plants on irrigation systems and irrigated lands.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 63-70.

The woody plant species discussed in the 7 abstracts submitted are willows, salt cedar, wild rose and box-elder. Of these, willows are the easiest to control, for which purpose relatively low rates of both amine and ester formulations of 2,4-D were found very satisfactory. With wild rose 2,4,5-T or a mixture of 2,4-D and 2,4,5-T, and with salt cedar the amine salt of 2,4-D and low volatile esters of 2,4,5-T gave good results. Applications of 2,4-D and 2,4,5-T were ineffective against box-elder.

571. BEARD, J. S.

The woody weeds of wattle plantations.

Chem. Weed Control in Southern Afr., being *Proc. 1st S. Afr. Weed Control Conf. 1950*, Johannesburg, issued 1951, pp. 33-9, bibl. 6 [received 1952].

Of all the herbicides so far tested by the Natal Tanning Extract Co. Ltd., Pietermaritzburg, only ammonium sulphamate and 2,4,5-T gave any promise against bramble, *Rubus* spp. The former chemical was found too costly, but applications of 2,4,5-T mixed with 2,4-D are considered economically feasible and worth further

trials. For bugweed, *Solanum auriculatum*, control, 2,4-D ester is recommended. Lantana, *Lantana camara*, control by chemicals was unsuccessful in these experiments, but it is thought that a combined mechanical and chemical treatment may eventually eliminate the shrub.

572. GATTIS, J. L., AND FRANCISCO, D.

Chemical brush control of rights-of-way in the Tennessee Valley region.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 143-5.

Best results were obtained with foliage application of equal parts of 2,4-D and 2,4,5-T esters at 4,000 p.p.m., using the equivalent of about 9-12 lb. acid per acre.

573. LYNN, G. E., AND BARRONS, K. C.

The hydrocyanic acid (HCN) content of wild cherry leaves sprayed with a brush killer containing low volatile esters of 2,4-D and 2,4,5-T.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 331-3, bibl. 2.

Data are presented showing that wild pin cherry, *Prunus pennsylvanica*, leaves sprayed with Esterton Brush Killer contained less hydrocyanic acid than untreated leaves, and it is concluded that spraying of this species with chemicals containing low-volatile esters of 2,4-D or 2,4,5-T does not make it more hazardous to cattle from the standpoint of hydrocyanic acid content.

574. WAYWELL, C. G.

A progress report on foliage sprays and bark treatments.

Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 116-19.

Data presented show that hawthorn, *Crataegus* spp., can be killed by various formulations of 2,4-D applied to the foliage when the leaves are fully expanded, by basal treatment with the butyl ester of 2,4-D or with a mixture of 2,4-D and 2,4,5-T with oil used as carrier, and that aftergrowth from stumps can be retarded or prevented by suitable treatment.

575. HATTINGH, E. R.

Can weed-killers be used in thorn scrub control?

Chem. Weed Control in Southern Afr., being *Proc. 1st S. Afr. Weed Control Conf. 1950*, Johannesburg 1951, pp. 43-8, bibl. 16.

A brief survey of the problem in South Africa suggests that it can be solved, but at considerable cost.

576. BRAMBLE, W. C., AND WORLEY, D. P.

Control of black locust with chemical spray.

Progr. Rep. Pa agric. Exp. Stat. 72, 1952,

pp. 5, bibl. 1, illus.

Of the methods tried in central Pennsylvania, a spray on freshly cut stubs of the original stem the first year, followed by two annual foliage sprays on the sprouts and suckers that arose after the stub spray, gave complete eradication of black locust, *Robinia pseudo-acacia*, with each of the following chemicals in water: 30% by weight ammonium sulphamate (Ammate); 0.78% (3,500 p.p.m. of acid) by volume of 2,4-D ester (Esterton 44); and 0.78% (3,700 p.p.m. of acid) by volume of 2,4,5-T ester (Esterton 245). Other spray schedules and

herbicides tested gave good control but did not eliminate locust. [From authors' summary.]

577. McCULLY, W. G., AND DARROW, R. A.
Control of post and blackjack oaks with growth-regulator herbicides.
5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 137-40.

Low volume aerial spray treatments offer the only feasible method for the control of extensive areas of woodland by chemicals. Results of preliminary trials in Texas indicate that single or repeated applications of 2,4,5-T or bushkiller mixtures at 1.5 lb. per acre or more may be necessary for the suppression of sprouts. Control of sprouts in small areas of sapling regrowth may be best obtained with basal treatments using esters of 2,4-D, 2,4,5-T or their mixtures at 16 to 24 lb. in 100 gal. of oil. Cut surface applications of similar treatments were found effective throughout the year. [From authors' summary.]

578. ALTONA, R. E.
Seasonal spray treatments of *Stoebe vulgaris* with 2,4-D and methoxone.
Chem. Weed Control in Southern Afr., being *Proc. 1st S. Afr. Weed Control Conf.* 1950, Johannesburg 1951, pp. 40-2.

Spring applications of both 2,4-D and methoxone gave the highest percentage kill of slangbos, *Stoebe vulgaris* infesting velds in the Transvaal.

Weed control in fruit crops.

579. BELZILE, A.
The problem of weeds in blueberry barrens.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 120-4.

The economic aspects of the blueberry crop in Canada are discussed, and weeds and woody growth infesting blueberry barrens are listed. Notes are given on preliminary work on weed control with the ethyl ester and amine and sodium salts [of 2,4-D] applied at rates equivalent to $\frac{1}{2}$ and 1 lb. of acid per acre at the Normandin Experimental Station, Quebec.

580. TREVETT, M. F.
Control of woody weeds in low-bush blueberry fields.
Bull. Me agric. Exp. Stat. 499, 1952, pp. 23, illus.

The herbicides suggested for use in blueberry fields include 2,4-D, 2,4,5-T and Ammate. Different methods of foliage applications and the stub treatment of woody plants are discussed. Lists of weeds infesting blueberries, classified as susceptible, moderately resistant and very resistant to 2,4-D, are given, and spray recommendations are made for the 3 classes. A formula for making up 2,4-D solutions and one to determine the acre rate of discharge of a power sprayer are appended.

581. KLINGMAN, G. C., AND MORROW, E. B.
Winter weed control in strawberries.
5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 166-9, being *Res. Pap. J. Ser. N.C. agric. Exp. Stat.* 414.

Dormant sprays appear satisfactory for the control of winter weeds in strawberries in North Carolina. The amine salt of dinitro ortho secondary butyl phenol at

3 lb. per acre was perhaps the most promising. Autumn treatments with 2,4-D, E.H.1 and PCP gave increased strawberry yields without delaying harvest, and controlled the weeds reasonably well. IPC gave satisfactory crop yields but only partial weed control. E.H.1 applied as a spring treatment following the dormant applications was only partially effective. IPC-3 Cl. applied in late spring gave the best weed control but was highly toxic to the strawberries.

582. BAILEY, J. S.
Experience with some new herbicides on strawberries.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 169-72.

Results of weed control in strawberries with Crag Herbicide 1, Dow General, Stoddard Solvent, 2,4-D, Weednix, CMU, Sulfasan and chloro IPC are tabulated.

583. ISLEIB, D. R., ALDRICH, R. J., AND BELL, H. K.
Effect of sodium 2,4-dichlorophenoxy ethyl sulfate on the growth and yield of strawberries.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 173-8, bibl. 4.

Applications of sodium 2,4-dichlorophenoxy ethyl sulphate (E.H.1), up to 10.8 lb. per acre in one season, did not reduce the yield of the 6 varieties of strawberries tested. A 3 lb. and a 6 lb. treatment of E.H.1 per acre 10 days after planting significantly reduced growth in the greenhouse. There was some indication that a single application of 3 lb. per acre between planting and 2 August resulted in an increase in the number of rooted runners.

584. WAYWELL, C. G.
A report on the use of several contact herbicides on chickweed (*Stellaria media* L.) and the effect of these treatments on strawberries 1951.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 273-4.

In trials at the Ontario Agricultural College, 0.8% potassium cyanate gave satisfactory control of chickweed without adversely affecting the strawberry plants. Sodium chlorate at 0.8% also controlled chickweed but damaged the crop plants. Varsol injured the strawberries and gave unsatisfactory weed control.

Weed control in vegetables and various other crops.

- 585.* FERGUSON, W.
Chemical weed control in vegetable crops in Canada.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 33.

As regards particular crops the following notes are given of developments in Canada. Broad-leaved weeds in sweet corn are controlled by 2,4-dichlorophenoxyacetic acid applied before corn is 6 inches high. In canning peas, where moisture conditions are favourable, a pre-emergence application of granular calcium cyanamide at 200-400 lb./acre gives good control. 2-methyl-4-chlorophenoxyacetic acid at 2 lb. in 50 gal. water/acre shows promise on the prairies. For onions, potassium

* See note, p. 3.

cyanate kills most of the common weeds, if applied when they are in the cotyledon stage. Pre-emergence and post-emergence treatments can be used at 12 lb. in 50 gal. water/acre, although a weaker solution is necessary when the onions are in the seedling stage to avoid injury. Experiments with Stoddard Solvent in which the aromatic content varied from 6% to 21.5% showed no significant differences in the effect on weeds or yields of carrots. Applied to leaves, this herbicide stops photosynthesis immediately and permanently in a susceptible plant but only temporarily in a tolerant plant. The effect on transpiration is similar. A new pre-emergence herbicide, para-chlorophenyl-1, 1-dimethyl urea, gave excellent and lasting weed control at low rates per acre. Although injurious to most vegetables the large seeded kinds such as beans, corn and peas showed no injury at 0.5 lb./acre and may withstand heavier applications. [From author's summary.]

586. ERICKSON, L. C., AND OTHERS.

The control of annual weeds in row crops and vegetables.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 108-17.

Reports under the following titles in this section are of horticultural interest: The effect of various herbicides on stands and yields of Fullgreen beans and Freezonian peas. Chemical weed control in lilies and daffodils. Weed control in garden flowers. Weed control in vegetable crops. Effect of pre-emergence chemical treatments on annual weeds and onions. Control of annual weeds in market onions with post-emergence chemical treatments. Factors influencing the effectiveness of oils in weeding carrots.

587. OTIS, C. E., AND RAYNOR, R. N.

Classification of the responses of annual, winter annual and biennial weeds and crop plants to herbicides.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 118-31.

Crop responses shown include those of beans, carrots, lettuce, melon, onions and tomatoes.

588. LACHMAN, W. H.

Chemical weed control in asparagus and sweet corn.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 105-10.

At the Massachusetts Agricultural Experiment Station pre-emergence applications of CMU at 2, 4 and 8 lb. per acre gave the most satisfactory weed control in asparagus, and granular cyanamide at 400 lb. per acre was also very effective. None of the 6 herbicides used in these trials caused any crop injury.

589. TAFURO, A. J., AND BEATTY, R. H.

Preliminary report of weed control on four different species of beans.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 83-6.

MCP (60 and 90%) at 1 lb. per acre appeared safe as a pre-emergence herbicide in Fordhook (lima), Tendergreen (snap), Hawkeye (soya) and Red Kidney (field) beans. LV-4, a low volatile 2,4-D ester, was too toxic to all beans. Premerge, at the recommended 3 lb. per acre rate, gave good weed control but caused injury to field beans.

590. DANIELSON, L. L., MARSHALL, E. R., AND VANGELUWE, J.

Pre-emergence weed control in beans with water soluble dinitro compounds.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 87-92, bibl. 2.

From results obtained in Virginia and New York it appears that water soluble dinitro compounds such as Sinox PE and Premerge can be used safely and effectively for pre-emergence weed control in field beans.

591. SWEET, R. D., AND RIES, S. K.

Herbicide screening with three species of beans.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 79-82.

The 3 bean species studied in New York were: *Phaseolus vulgaris* 2 varieties, and *P. limensis* and *P. lunatus* 1 variety each. Of the wide range of commercial herbicides effective for pre-emergence weed control, only a very few show any promise when applied post-emergence. Dinitros, oils and PCP, all very good pre-emergence sprays, were particularly harmful when applied to the foliage. With the possible exception of E.H.1, none of the 17 herbicides tested can be safely used for post-emergence treatment of beans commonly grown in New York.

592. JACOB, W. C.

The comparison of several chemicals as weed control agents in lima beans.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 93-5, bibl. 2.

At Cornell, 12 herbicides at 2 rates each were applied pre-emergence to lima beans. The hormone-like materials MCP, 2,4-D plus MCP, Crag No. 1, and APC 904 all gave satisfactory weed control with no crop injury at rates of $\frac{3}{4}$ and $1\frac{1}{2}$ lb. per acre. Dinitros were satisfactory at 3 lb. per acre. CMU was not considered safe on lima beans.

593. TREVETT, M. F., AND LITTLEFIELD, R.

Weeding snap beans with dinitro herbicides, 1948 to 1951.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 179-85.

Selective and residual dinitro herbicides, under conditions of moderate rainfall following application on sandy or heavier loam soils, appeared safe for pre-emergence weed control in snap beans. Where broad-leaved weeds predominate, 1 lb. of a DNOSBP formulation per acre is considered sufficient, but for the control of grassy weeds a 3 lb. per acre treatment is recommended. Applications within 48-72 hr. of bean emergence resulted in better control than treatments made at sowing.

594. SWEET, R. D., RIES, S. K., AND PATTERSON, M. E.

Chemical weeding of red beets.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 111-17, bibl. 5.

In 4 experiments conducted in New York, 6 lb. of Endothal consistently proved to be the best pre-emergence treatment for controlling most weeds in red beets, except *Chenopodium album*. Trial applications

of CMU at $\frac{1}{4}$ and $\frac{1}{2}$ lb. per acre are suggested for plots where this weed is a problem.

595. KAUDY, J. C., BERGER, K. C., AND TRUOG, E.
Borax applications to canning and sugar beets for the control of weeds.
Agron. J., 1952, 44: 409-10, bibl. 6.

In experiments in 1948, 1949, and 1950 at the University of Wisconsin, Madison, borax was applied at rates ranging from 20 to 80 lb./acre either at each side of and slightly below the beetroot seed or in a 4-inch band on the soil surface over the seed. At 40 lb./acre by either method weeds were very effectively controlled. Surface application generally gave a better control of weeds in the row than side-of-seed application, and gave a decrease of as much as 65% in the number of weeds. Slight yield decreases resulted from applications exceeding 60 lb. The weeds remaining after a 40 lb./acre application were generally so stunted that hand weeding was unnecessary.

596. SWEET, R. D., AND RIES, S. K.
Growth of cabbage and cauliflower following application of TCA on quackgrass.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 101-3, bibl. 1.

Pre-emergence TCA applications at 25, 50 and 100 lb. per acre gave excellent control of quackgrass, due partly to favourable weather conditions. No harmful effects on the average weight of cauliflowers were observed, and the Erfurt and Supersnowball varieties, which represent the two important types grown in New York, were equally tolerant of TCA. Of the two cabbage varieties, Danish appeared unaffected, but Glory exhibited very striking toxicity symptoms. In spite of injury there was no statistically significant yield reduction with the Glory variety, and the average head weight of treated Danish cabbage was greater than that of the untreated plants.

597. EMOND, R. E., AND MOFFAT, F. G.
The effects of Stoddard Solvent as a selective herbicide in celery.
Suppl. Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 59-65, bibl. 5.

Regardless of size of crop and time of transplanting, celery grown in Ontario mucklands was resistant to 50 gal. of Stoddard Solvent sprays applied within 3 weeks of transplanting. Treatments made after 3 weeks growth in the field injured the plants and reduced yields.

598. SWEET, R. D., AND RIES, S. K.
Chemical weeding of cucurbits.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 187-91, bibl. 2.

N-1-naphthyl phthalamic acid at 2 lb. per acre gave effective weed control in cucurbits whether applied pre- or post-emergence. Crop injury from pre-emergence sprays at this rate was negligible on all the following 5 species weeded, *Cucurbita maxima*, *C. pepo*, *Cucumis melo*, *C. sativus* and *Citrullus vulgaris*. Esso 180 and DN were found satisfactory for pre-emergence treatment and E.H.1 as a foliage spray. TCA controlled grasses but was toxic to the crops, while IPC, not particularly toxic, did not control all the weeds.

599. PAPAI, M., MARSHALL, E. R., AND VAN-GELUWE, J.
Endothal, E.H.1 and other materials for pre- and post-emergence weed control in muck grown onions.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 119-28.

Of the materials tested in New York, specially formulated Endothal at $2\frac{1}{2}$ to 5 lb. per acre gave the most promising results as a pre-emergence herbicide for onions grown in muck soils of pH 5-6. CMU, Sinox PE and Niagarthal W injured the emerging crop. E.H.1 at 5-6 lb. per acre, applied when the onions were past the "flag stage" and before they were 6 in. high, gave good control of $\frac{1}{2}$ in. high weed seedlings. Combinations of materials were no more effective than the herbicides used alone.

600. ANTognini, J., AND PERKINS, D. Y.
Additional experiments with Aero Cyanate for weed control in onions.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 129-32, bibl. 1.

Further evidence was obtained confirming that the best conditions for Aero Cyanate applications for purslane control are low temperature and wind velocity and relatively high humidity [see *H.A.*, 21: 3527]. When the herbicide was applied in the morning (9 a.m.), 100 gal. per acre was found sufficient, but when applied in the afternoon (1 p.m.), significantly better results were obtained with 200 gal. per acre. The morning applications of 100 gal. gave considerably better weed control than afternoon applications of 200 gal. Results obtained from Aero Cyanate applications to onions at 4 different stages of growth appear inconclusive.

601. PETERSON, C. E., DENISON, E. L., AND BARGER, E. L.
Weed control in onions with a shielded nozzle sprayer.
Down to Earth, 1951, 6(4): 1-4, bibl. 1, illus.

Experiments carried out in Iowa in 1950 showed that with a shielded nozzle sprayer weeds in onions can be controlled chemically without injuring the crop. All the chemical treatments gave good control of purslane (*Portulaca oleracea*) and other weeds growing between the onion rows and in the weed plots sprayed separately.

602. PATTERSON, M. E.
Comparative effects of various weed killers on yield, weed control, and tenderometer values for peas.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 133-9, bibl. 5.

Data for weed counts, weed control ratings, yield, per cent of large peas, and tenderometer values obtained on 16 plots receiving different treatments are tabulated. MCP at 2 lb. in 20 gal. per acre appeared to give the best weed control without reducing the yield or quality of peas.

603. DADD, C. V.
Chemical control of weeds in peas and lucerne.
J. Inst. Corn agric. Merch., 1952, 3: 173.

Peas: The weeds must be sprayed in the young stage, especially when DNBP is used. The use of MCPA and 2,4-D is considered inadvisable.

604. BENDER, E. K., AND STARK, F. C.

Weed control experiments with spinach and canning peas.*Proc. 6th annu. Mtg N.E. Weed Control Conf.* 1952, New York, pp. 141-7, bibl. 7.

In trials in Maryland, granular cyanamide at 400 lb. per acre, applied 4 to 7 days before seeding to well prepared, adequately moist soil, resulted in increased yield of spinach, good control of certain weeds and minimum reduction in the stand of the crop. Granular cyanamide was also found effective for weed control in peas, when applied 4 days after sowing at 275 lb. per acre. For post-emergence weed control in peas Dow Selective Weed Killer at 3 pt. per acre gave satisfactory results.

605. RIES, S. K.

Chemical weeding of spinach.*Proc. 6th annu. Mtg N.E. Weed Control Conf.* 1952, New York, pp. 149-60, bibl. 9.

IPC at 4 lb. per acre gave effective control of chickweed, purslane, smartweed, and most annual grasses when the mean temperature following application was below 60° F., but did not control lambs quarter, pigweed, groundsel and other broad-leaved weeds infesting spinach plots. Chloro IPC at 2 lb. per acre was as effective as IPC at 4 lb. if applied in warmer weather. CMU at $\frac{1}{2}$ lb. per acre controlled almost all annual weeds without injuring the spinach, but should be further tested before more extensive use. More work should also be done with another promising herbicide for spinach, Endothal. Contact herbicides such as aromatic oils, pentachlorophenols and NIX applied after weed but before crop emergence proved effective.

606. OTIS, C. E., AND OTHERS.

Use of herbicides for control of weeds in drying and maturing crops.*Res. Progr. Rep. 13th west. Weed Control Conf.*, Reno, Nev., 1952, pp. 157-65.

The 8 reports submitted discuss the pre-harvest treatment of flax, castor beans and legume and grass seed crops for early maturation and incidental weed control. In that entitled "Pre-harvest use of contact herbicides for drying and maturation of castor beans" it is pointed out that in harvesting this crop the whole plant is cut and passes through the thresher, and successful seed separation is accomplished only after the plant is sufficiently dry as the result of a killing frost or special treatment. It is shown that applications of dinitro-o-secondary-butylphenol or amylphenol at the rate of 1-2 lb. per acre in 10-12 gal. of diesel oil, or pentachlorophenol at 4 lb. per acre in 10-12 gal. of a high aromatic weed oil resulted in the dehydration of the entire castor bean plant, rendering it suitable for combining. Both types of chemical were sprayed by aeroplane 5-7 days prior to the estimated date of harvest. The treatment enabled harvesting to be done without waiting for frost and freed the land for the planting of winter crops.

607. GANGSTAD, E. O., AND OTHERS.

Chemical weed control in sansevieria with CMU (3(p-chlorophenyl) 1, 1-dimethylurea).*Abstr. in 5th Proc. south. Weed Conf.*, Atlanta, Ga, 1952, pp. 173-4.

On sandy soils, pre-emergence treatment with CMU at 3-5 lb. active ingredient per acre in 100 gal. gave good control of weeds for 5-6 months. Post-emergence

applications to relatively heavy growth of weeds at 7-10 lb. were effective for only 3-4 months. Rates of over 10 lb. per acre, required on organic soils or under conditions of extremely high rainfall, injured the sansevieria, but most of the plants recovered in 3-4 months. For best results CMU should be applied at the beginning or near the end of the rainy season when the rainfall is moderate.

608. WILSON, R. W., AND KLINGMAN, G. C.

Progress in chemical weed control with field grown tobacco.*5th Proc. south. Weed Conf.*, Atlanta, Ga, 1952, pp. 129-32, being *Pap. J. Ser. N.C. agric. Exp. Stat.* 415.

Experimental work in North Carolina over the past 3 years on methods of cultivation has indicated that scraping the plots for weed removal is satisfactory on all but very heavy soils. Shallow cultivation appears necessary on the heavier soils. Chemical weed control in field grown tobacco is at present considered inadvisable, but further studies are to be made with the more promising herbicides used in these trials, including pentachlorophenol, TCA and dinitros.

Weed control in ornamentals and turf.

609. GOULD, C. J., BAUR, K., AND TREMBLAY, T.

Chemical weed control in bulbous plantings.*Flor. Exch.*, 1952, 118 (18): 12, 47.

In trials carried out over 2 years in Western Washington pre-emergence application of a herbicidal mixture containing 1 quart Dow General Weed Killer, 50 gal. diesel oil and 4 lb. of 50% IPC gave very satisfactory weed control in narcissus and bulbous iris beds. While the mixture has been well tested, it is recommended for use only when weed infestation is serious and then at least 10 days before expected emergence.

610. COWPERTHWAIT, W. G.

Progress report on weed control in gladiolus.*5th Proc. south. Weed Conf.*, Atlanta, Ga, 1952, pp. 170-2.

The herbicides found promising for pre-emergence weed control in gladiolus fields in Florida were: CMU, MCP, Chloro-IPC, Crag, 2,4-D, 2,4,5-T and Premerge. All these materials gave satisfactory weed control and, with the exception of high rates of CMU and calcium cyanamide, caused no injury to gladioli. MCP, Chloro-IPC and Crag were also applied post-emergence without any apparent injury. The contact herbicides NIX and Aero Cyanate showed promise, though NIX at 4 lb. per acre slightly burned the gladioli.

611. PRIDHAM, A. M. S., AND OTHERS.

Weeds of nurseries and landscape plantings.*Proc. 6th annu. Mtg N.E. Weed Control Conf.* 1952, New York, pp. 283-9.

Notes are given by individual authors on the control of *Alnus incana* (speckled alder), *Agropyron repens* (quackgrass), *Artemisia vulgaris* (chrysanthemum weed) and *Stellaria media* (chickweed).

612. WATSON, J. R., JR.

Chemical control of crabgrass in special purpose turf.*5th Proc. south. Weed Conf.*, Atlanta, Ga, 1952, pp. 179-81.

In trials conducted by the Texas Agricultural Experiment Station, sodium arsenite seemed to be most effective against mature crabgrass in Bermuda grass, though potassium cyanate was also very satisfactory. Phenyl mercuric acetate gave good results in spring treatments, but all 3 chemicals caused temporary browning of Bermuda grass lasting for 4-6 days.

613. ROBINSON, B. P.

A comparison of several herbicides for weed control in turf.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 182-5.

Herbicides tested for the selective control of crabgrass and weeds in Bermuda grass turf during a 4-year period at the Georgia Experiment Station are evaluated. PMA, P806, P641 and TAT (phenyl mercury acetate) have been the most effective of the mercury compounds. Other chemicals giving good weed control included sodium arsenite, lead arsenate and potassium cyanate.

614. PEEK, N. S., JR., AND HINKLE, D. A.

Control of crabgrass and wild onions in a Bermuda grass turf.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 186-9.

Results of 2 separate trials at the Arkansas Agricultural Experiment Station show that spray applications of phenyl mercuric acetate tended to give best control of crabgrass in lawns and turf after the weedy grass has passed the seedling stage of growth; and that 2 applications of 58% diethanolamine salt of maleic hydrazide at rates of 1 to 6 gal. per acre gave excellent control of wild onions.

615. DeFRANCE, J. A., AND SIMMONS, J. A.

A comparison of chemicals for crabgrass control and a study of some factors related to the control of crabgrass with phenyl mercury compounds.

Suppl. Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 67-75, bibl. 7, being Contr. R.I. agric. Exp. Stat. 791.

Results of experiments in Rhode Island indicated that formulations of phenyl mercuric acetate such as PMAS and Tat C-lect as liquids, and Scuti as dry material are very effective for crabgrass control. PMAS at 2½ oz. in 2½ to 10 gal. of water per 1,000 sq. ft. applied 3 times, at intervals of 7 to 14 days gave very satisfactory control. When, however, a wetting agent was added and the interval between the treatments was reduced the action of the herbicide appeared to be faster. Scuti applied on wet foliage was more effective than on dry foliage. Neither PMAS nor Scuti injured the turf, and they caused only very little discoloration. Potassium cyanate at effective rates injured the basic turf grasses and other materials tested were unsatisfactory for crabgrass control.

616. DeFRANCE, J. A., AND SIMMONS, J. A.

Comparison of various chemicals for crabgrass control in turf.

Proc. Amer. Soc. hort. Sci., 1952, 59: 479-82, bibl. 8, being Contr. R.I. agric. Exp. Stat. 774.

Four organic phenyl mercury compounds gave excellent control of crabgrass, *Digitaria sanguinalis* and *D.*

ischaemum, in lawn turf when applied 3 times at 10-day intervals at 2 or 2½ oz. in 5 gal. water per 1,000 sq. ft. Discoloration of the permanent turf grasses was slight. Sodium arsenoacetate gave fair to good control but with slightly more turf discoloration. Potassium cyanate, maleic hydrazide, sodium arsenite and 3 chloro IPC either gave less control of crabgrass or did more damage to the turf; IPC, however, deserves further trial at higher concentrations.

617. ENGEL, R. E., AND ALDRICH, R. J.

Effectiveness of chemical combinations for crabgrass control.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 265-6.

An addition of ¼ lb. of 2,4-D per acre increased the efficiency of the contact crabgrass herbicides such as sodium arsenite and potassium cyanate, and caused no or only very slight turf injury.

618. BANNERMAN, L. W., ENGEL, R. E., AND ALDRICH, R. J.

Effectiveness of potassium cyanate dusts for crabgrass control.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 267-9.

Where potassium cyanate was applied as a 25% dust (with a duster) to turf for crabgrass control, there was extreme burning of the turf in contrast to a 10% dust (applied by hand) which caused only slight injury. The efficiency of the 25% dust was greatly increased by the addition of a wetting agent. The 10% dust gave considerable crabgrass control, but it is thought that the addition of a wetting agent may improve its efficiency.

619. SIMMONS, J. A., AND DeFRANCE, J. A.

The effectiveness of chemicals for the control of mouse-ear chickweed in turf.

Suppl. Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 77-84, bibl. 5, being Contr. R.I. agric. Exp. Stat. 792.

In trials at the Rhode Island Agricultural Experiment Station sodium arsenite and 2,4-D formulations were the most effective materials for the eradication of mouse-ear chickweed, *Cerastium vulgatum*. In most cases one treatment of any 2,4-D material and two or more applications of sodium arsenite gave complete control. Notes are given on the herbicidal effects of 11 other materials or combinations used in these experiments, which were less satisfactory than either sodium arsenite or 2,4-D.

Weed control in sugar cane.

(See also 660i.)

620. ANON.

Chemical control of weeds. Its application to the sugar industry.

S. Afr. Sugar J., 1952, 36: 545-9, 553-5, bibl. 42, illus.

Large scale trials with 2,4-D as a pre-emergent, post-emergent and contact spray against weeds on the Illoro Sugar Estates are outlined. Application has been by a simple boom sprayer with knapsacks for spot spraying. Preliminary results have been most successful and it would appear that the cost of chemical control is below

that of hand weeding. Elsewhere tests are being made with an oil emulsion containing 2,4-D as a "total" weed-killer, for use particularly against watergrass which is resistant to 2,4-D alone. Experience with herbicides in other sugar cane growing countries is reviewed.

621. STAMPER, E. R., AND CHILTON, S. J. P.

Johnson grass and chemicals in sugar cane in Louisiana.

Down to Earth, 1951, 6 (4): 9-10, bibl. 6, illus.

The best procedures for the elimination of Johnson grass seedlings in sugar cane have been a combination of 2,4-D as a pre-emergence spray at 2 lb. per acre, another application of 2,4-D at the same rate, followed by flame cultivation before the surviving seedlings have established a root system; or the use of TCA as a pre-emergence spray at 10-15 lb. per acre. Preliminary tests showed also that relatively small amounts of TCA when applied as 24-30 in. bands on the rows early in the spring after the ratoon cane was shaved and off-barred, thus exposing the rhizomes, gave relatively good control of large Johnson grass plants.

622. STAMPER, E. R., AND CHILTON, S. J. P.

Chemical control of Johnson grass seedlings in sugarcane.

5th Proc. south. Weed Conf. Atlanta, Ga, 1952, pp. 105-7.

The results reported are a continuation of earlier observations made on sugar cane plantations in Louisiana [see *H.A.*, 22: 2494]. There was little or no difference in weed control by 2,4-D plus flaming and TCA plus 2,4-D, and again 2,4-D alone was found unsatisfactory. Weights of both cane and sugar per acre were increased considerably by the control of Johnson grass in plant cane and first ratoons.

623. HARDCASTLE, W. S., AND STAMPER, E. R.

The effect of chemicals on Johnson grass rhizomes.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 113-15.

TCA applied at the rate of 10 lb. per acre plus 1 lb. of 2,4-D provided a cheap and efficient method of reducing Johnson grass infestation in sugar cane fields of Louisiana.

624. CHURCHWARD, E. H.

Chemical control of weeds on an irrigated farm at Bundaberg.

Proc. 19th Conf. Qd Soc. Sugar Cane Tech., 1952, pp. 143-6, illus.

Examples are given in which pre-emergence applications of 2,4-D, with one unexplained exception, successfully and economically controlled weeds, including grasses, in irrigated sugar cane grown on forest or red volcanic soils that were free from nut grass.

Herbicides.

(See also 660h, k, m, n.)

625.* IVENS, G. W., BLACKMAN, G. E., AND WOODFORD, E. K.

The development of selective weed control in horticultural crops.

[*Mim. Pap.*] *13th int. hort. Congr.*, London, 1952, pp. 9.

* See note, p. 3.

In Great Britain sulphuric acid was the first compound to be developed for the selective control of weeds in horticultural crops and its application for weed destruction in onions and leeks was based on its known principles of selectivity in cereals, namely, variations in spray retention by the shoot and the different position of the primary meristems in monocotyledonous crops and dicotyledonous weeds. With most other horticultural crops these differences are far less marked and successful methods must rest on the discovery of truly selective compounds or on the alternative of pre-emergence spraying. Established herbicides for specific crops include sulphuric acid for onion and leeks, mineral oils for carrots and other umbellifers and dinitro-secondary butyl phenol for peas. The use of these compounds and the possibilities of alternative herbicides for these and other crops including beets, strawberries and bush fruits are discussed. The extension of the pre-emergence technique which was first evolved in 1942 has been twofold. One method relies on the emergence of the weeds before the crop and their destruction by a "contact" herbicide, which ideally should kill all the weed species receiving the spray droplets but not leave toxic residues in the soil. The alternative approach is dependent on the "residual" concentration of the herbicide in the surface soil being sufficient to kill the weeds in the germination phase. Contact methods are more generally applicable as they are less dependent on weather conditions and are particularly valuable for all crops which germinate slowly. For crops with a rapid germination delayed sowing after preparation of the seedbed may allow of contact spraying. [Authors' summary.]

626. FULTS, J. L., AND OTHERS.

Physiological and chemical studies.

Res. Progr. Rep. 13th west. Weed Control Conf., Reno, Nev., 1952, pp. 145-56.

Physiological studies: Absorption, translocation, mechanism of action and selectivity are discussed in the contributions to this section. Investigations by V. F. Burns have shown that soil applications of TCA round apricot and prune trees for the control of quackgrass caused leaf chlorosis in both tree species. Analyses showed that leaves from treated plants contain greater amounts of Cu, Mn, Si, P, Mg, Ca, Na, K and Cl than those from untreated ones. The data further indicate the possibility of translocation of the TCA. Undoubtedly the metabolic processes were seriously disturbed since the Mg:K, Mg:(K/Na) and Fe:Mn ratios departed from normal and the P content of affected leaves was increased by 100 and 200%. *Chemical studies:* Results of screening, evaluation and comparisons of herbicides are reported.

627. LINDER, P. J.

Movement and persistence of herbicides following their application to the soil surface.

Proc. 6th annu. Mig N.E. Weed Control Conf. 1952, New York, pp. 7-11, bibl. 2.

The chemicals tested were: CMU (3-*p*-chlorophenyl-1,1-dimethyl-urea), E.H.1 (sodium 2,4-dichlorophenoxy ethyl sulphate) and chloro-IPC (isopropyl-N (3-chlorophenyl)-carbamate). A thin concentrated layer of these herbicides near the soil surface was found most effective for inhibiting the growth of mustard seedlings. All 3 remained approximately in the top 3 mm. layer of loam

regardless of whether 40 or 100 gal. of water was applied. Water applied to simulate $\frac{1}{2}$ in. rain washed some of the herbicides downwards, making them somewhat less effective. Their activity in the upper 6 mm. layer of loam decreased markedly during 1 month of storage under humid conditions. [From author's summary.]

628. FRANS, R. E., AND ALDRICH, R. J.
Soil sterilants for the control of perennial weeds—progress report.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 23-31, bibl. 3.

Results of experiments in both eastern and western United States indicate that sodium arsenite persists longer in western soils. Sodium TCA and CMU have been very effective in controlling one season's growth of quackgrass, *Agropyron repens*, and nutgrass, *Cyperus esculentus*, and are to be tested next year for complete eradication. Some combinations of TCA, chloro-IPC, sodium arsenite, CMU and 2,4-D were found very satisfactory soil sterilants and are to be further studied.

629. SINCLAIR, A. T.
History, development and summary of experimentation with calcium cyanamide.

Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 44-8.

Cyanamide in addition to its value as a N fertilizer possesses useful herbicidal properties and can be applied to a variety of crops. In experimental work in Canada it has been successfully used in the pre-emergence treatment of peas, beans, beets, and onions, post-emergence treatment of various flowers, and as a soil sterilant for tobacco seed beds, lawns and greenhouse benches.

630. FERGUSON, W., AND JASMIN, J. J.
Weed control studies with calcium cyanamide.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1951, pp. 49-51.

Data are presented indicating that successful weed control in peas can be obtained in some areas in Canada with granulated calcium cyanamide.

631. PAYREBRUNE ST. SÈVE, G. BARON DE.
Die Mineralöle in der Unkrautbekämpfung. (Mineral oils as weedicides.) [English summary $\frac{1}{2}$ p.]
Z. PflKrankh., 1952, 59: 255-75, bibl. 107, illus.

Our present knowledge of the application of mineral and tar oils for weed control is reviewed. The fractions of the heavy petrols, of kerosene and of the medium heavy oils within the lower boiling range are mostly used for controlling weeds. Certain heavy petrols with a boiling point between 150 and 200° C., a flash point over 38° C. and a content of 12-15% aromatic compounds are specially useful for selective weed control in umbelliferous crops.

632. EMOND, R. E.
The utilization of petroleum products as herbicides.

Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 52-6, bibl. 15.

Notes are given on Stoddard Solvent applications for weed control in celery, cranberries, spinach, onions, and beans, and on highly refined non-aromatic oil

applications to inhibit sucker growth in tobacco and control weeds in onions, lettuce, radishes and peas. Petroleum oils are also used for dormant brush control and soil sterilization.

633. FERGUSON, W., AND JASMIN, J. J.
Some results with herbicidal oils of different aromatic content.

Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 57-9.

Further results are presented on the good herbicidal effects of Stoddard Solvent in carrots. While in 1950 an oil containing 6% aromatics was found most satisfactory [see *H.A.*, 22: 435], in 1951 Stoddard Solvent oils of 7.5 to 21.5% aromatic concentration showed no appreciable difference in weed control or carrot yields.

634. GONGGRIJP, J.

Het gebruik van oliehoudende onkruidbestrijdingsmiddelen in Indonesië. (The use of oil-containing herbicides in Indonesia.)
Bergcultures, 1952, 21: 215-27, bibl. 3.

Experiments were undertaken by the Shell Laboratory, Amsterdam, to determine whether oil herbicides could be used under Indonesian conditions to control grasses. In the general experiments, diesel oil mixtures were tested onalang grass, grasses other than lalang, *Cyperus rotundus*, and mixtures of broad-leaved weeds with grasses. Good control of lalang was obtained with 5-10 applications of Shell Weedkiller EF-140 (containing pentachlorophenol+emulsifier) and diesel oil, a total of 3,000-6,000 l. oil per ha. being used. Less oil was required if the lalang was cut down 2-3 weeks before the first application. The second application should be made 3 weeks after the first and the following ones at 10-day intervals. Finally only spot applications at 3-4 week intervals will be needed and a good cover crop should be sown. The method is expensive and should only be used where mechanical control is impracticable. *Cyperus rotundus* was best controlled by an application of 3 l. 2,4-D ester in 500-600 l. oil. Good control of mixtures of broad-leaved and grass weeds was obtained with 2-4 kg. PCP or DNOC+30-40 l. diesel oil in 300-600 l. water per ha. Experiments were also made to compare the value of oil herbicides with other methods of weed control in rubber, oil palm, and tea plantations, and rice, sugar cane and tobacco fields. No damage was done to rubber trees unless the oil came in contact with the leaves or young bast. The yield of oil palms was increased by the use of oil sprays to control lalang, compared with the use of sodium arsenite.

635. IVENS, G. W.
The phytotoxicity of mineral oils and hydrocarbons.
Ann. appl. Biol., 1952, 39: 418-22, bibl. 6.

After a review of work done on the correlation of toxicity with physical and chemical properties of oils the author gives some of the results obtained in an investigation into the toxicity of mineral oils and hydrocarbons to plants being conducted by the Agricultural Research Council Unit of Experimental Agronomy. Experiments with various aromatic, paraffin, cycloparaffin and olefine hydrocarbons indicated that in the vapour phase there are no very large differences in toxicity. There is, however, considerable evidence of differences in toxicity of the different groups of compounds when used as liquids. Many hydrocarbons of

higher boiling point, which are not toxic in the vapour phase, are extremely toxic as liquids.

636. JOHNSON, C. M., AND HOSKINS, W. M.
The relation of acids and peroxides in spray oils to the respiration of sprayed bean leaves and the development of injury.
Plant Physiol., 1952, 27: 507-25, bibl. 27, illus.

Highly refined petroleum oils, containing no aromatics, and oxidized oils prepared from the neutral stocks were used in phytotoxicity studies on bean leaves. Visual injury to bean leaves was best correlated with acidity of the oxidized oils. The lower limit of acidity of the oils associated with acute injury of bean leaves was near 5 m. eq./kg. High peroxide concentrations resulted in evidence of injury after longer periods of exposure. A more sensitive measure of injury was the reduction in oxygen absorption of bean leaf fragments when treated with the oils. [From authors' summary.]—Univ. Calif.

637. FERGUSON, W., AND JASMIN, J. J.
Weed control studies with CMU.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 34-5.

Observations made at the Central Experimental Farm, Ottawa, indicate that 3-*p*-chlorophenyl-1, 1-dimethylurea applied at low rates may become a valuable herbicide for the pre-emergence treatment of certain vegetables. Of those tested, beans appeared to be the most resistant to CMU, cabbage and onions the least.

638. KNOWLES, G.
The effect of CMU on annual weeds and on nine different crops when applied before emergence.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, p. 36.

Rates of $\frac{1}{2}$, $\frac{1}{4}$, 1, 2 and 3 lb. per acre of 3-*p*-chlorophenyl-1, 1-dimethylurea were applied to a number of crop plants. Good weed control was obtained with the higher rates, which, however seriously damaged or killed some of the crop plants. Peas and beans appeared moderately resistant to CMU.

639. COLLINS, W. B., AND EVERETT, C. F.
CMU experiments at Fredericton.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 39-42.

Pre-emergence applications of 3-*p*-chlorophenyl-1, 1-dimethylurea were made at rates ranging from $\frac{1}{4}$ lb. to 3 lb. per acre in crops including turnips, carrots, beets, peas, beans, parsnips, lettuce and spinach. The lower rates did not give satisfactory enough control of annual weeds and left couch grass unaffected while the higher rates which killed the annuals and partially destroyed couch grass, had an adverse effect on the crops.

640. KNOWLES, G.
The effect of CMU on couch grass.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, p. 36.
WIANCKO, M. R.
Observations of the effect of CMU on couch grass.
Ibidem, p. 38.

Notes are given on two independent trials in Ontario both showing that 3-*p*-chlorophenyl-1, 1-dimethylurea

applied in the spring at rates 40, 80 and 100 lb. per acre to couch sod gave practically complete eradication. Data on autumn treatment are not yet available.

641. SNYDER, G. R.
Progress report with CMU weed killer on railway right-of-way (ballasted section).
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, pp. 29-31.

In trials conducted in Eastern and Western Canada 3-*p*-chlorophenyl-1, 1-dimethylurea applied at 20, 40, 80 and 100 lb. per acre gave, with a few exceptions, effective control of grasses, annual and perennial weeds and some woody plants. A test with CMU in conjunction with amine type 2,4-D indicates that the two chemicals are compatible and rate of activity against both broad-leaved weeds and grasses appears to be increased by their combination.

642. KNOWLES, G.
The effect of CMU on deep rooted perennials.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, p. 37.

In nursery plots, 3-*p*-chlorophenyl-1, 1-dimethylurea applied at rates of 20, 40 and 80 lb. per acre gave almost 100% control of 5 deep-rooted perennials. The 6th weed species tested, field bindweed, was controlled satisfactorily only by the 2 higher rates of application.

643. BRAGG, K. K.
Effect of CMU on poison ivy.
Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, p. 43.

Both 30 and 60 lb. of 3-*p*-chlorophenyl-1,1-dimethylurea per acre gave satisfactory control of poison ivy in Ottawa. Virginia creeper responded to CMU more slowly than did the ivy, and the lower rate of application was found inadequate for its control.

644. DE ROSE, H. R.
Responses of certain crop plants to 3-nitro-4-hydroxybenzoic acid.
Suppl. Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, p. 57.

Soil applications of 3-nitro-4-hydroxybenzoic acid induced albinism in many grassy and broadleaved plants, but at the rates used were ineffective against 16 species including garden pea and Red Kidney bean. Crabgrass appeared to be the most sensitive of those tested and the possibility of applying this herbicide for the selective control of crabgrass is suggested.

645. STANDEN, J. H.
Two herbicides of value in weed control in vegetables.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 75-7.

Good-rite NIX or sodium isopropyl xanthate used under right conditions kills soft succulent plant tissues, but more mature, hardened or woody tissues, and those with a waxy surface are more resistant to it. When weeding vegetables, the spray, applied at 1 lb. in 10 gal., 80 gal. per acre, should be directed below the foliage to prevent injury. NIX must be applied at temperatures of 70° F. or above, and sunlight helps its action. The second herbicide, Good-rite Oktone, is a saturated (40%) solution of octachlorocyclohexenone in petroleum oil and is diluted in oil or kerosene. Both herbicides are contact killers and have no hormone action,

but they differ in other characteristics and to some extent complement each other.

646. STANDEN, J. H.

Two herbicides for use in greenhouses.

Proc. 6th annu. Mtg N.E. Weed Control

Conf. 1952, New York, pp. 291-2.

The use of Good-rite Oktone and NIX for weed control in greenhouses is described [see also abstr. 645].

647. VLITOS, A. J.

The influence of environmental factors on the activity of Crag herbicide 1 (sodium 2,4-dichlorophenoxyethyl sulfate).

Proc. 6th annu. Mtg N.E. Weed Control

Conf. 1952, New York, pp. 57-62, bibl. 2.

Crag Herbicide 1 has been shown to be converted to an active herbicidal compound in sterile soils of low pH, and in acid or neutral non-sterile soils. In highly alkaline soils no conversion occurs. The herbicidal form of Crag Herbicide 1 develops in soil more readily at high temperatures (24-30° C.). It is suggested that the method of microbial activity on sodium 2,4-dichlorophenoxyethyl sulphate is the secretion of bacterial or fungal acids causing hydrolysis of the molecule to its active compound. [See also *H.A.*, 21: 2539 and 22: 2508.]—Boyce Thompson Inst.

648. GALLUP, A. H., AND GUSTAFSON, F. G.

Absorption and translocation of radioactive 2,4-dichloro-5-iodo¹³¹-phenoxyacetic acid by green plants.

Plant Physiol., 1952, 27: 603-12, bibl. 8, illus., being *Pap. Dep. Bot. Univ. Mich.* 960.

In order to investigate the selective action of hormone herbicides, the radioactive morpholine salt of 2,4-dichloro-5-iodo¹³¹-phenoxyacetic acid (2,4-DI) was used in a study of absorption and translocation in a number of mono- and dicotyledonous plants (bean, sunflower, oats, wheat, maize, dandelion, orchard grass and narrow-leaved plantain). It was found that this growth regulator was absorbed by all the species tested but much more slowly by the mono- than by the dicotyledonous plants. Translocation to the apical portions was also much slower in the monocotyledons. There seemed to be a block to translocation in the intercalary meristem of monocotyledonous leaves. Although the selective action of 2,4-D has not been fully explained, it is believed that the slower absorption and translocation in the monocotyledons is a contributing factor in their greater resistance.

649. NEWMAN, A. S., THOMAS, J. R., AND WALKER, R. L.

Disappearance of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid from soil.

Proc. Soil Sci. Soc. Amer., 1952, 16: 21-4, bibl. 12.

2,4-D was incubated in the laboratory with different depths of Duffield silty clay loam, and its disappearance therefrom was determined by a cucumber root elongation test. The lag period before onset of decomposition and the time required for complete decomposition of 2,4-D increased with depth. The lag period varied from 14 days in the 0- to 6-inch sample to 42 days in the 18- to 21-inch sample. On re-treatment with 2,4-D the differences among the depths were much smaller than

with the original treatment. Disappearance of 2,4-D and of 2,4,5-T under field conditions was studied in plots treated with these compounds at rates of 0.0, 0.2, 1.0 and 2.5 grams per square yard in 1949, and re-treated with one gram per square yard in 1950. 2,4,5-T persisted more than 19 weeks; its persistence was not influenced by previous treatment. The effective concentration of 2,4-D was reduced more rapidly in soils in which it had decomposed previously. This compound persisted 5 and 6 weeks, respectively, in plots which had and had not been treated previously. A substance which stimulated root elongation of cucumber was produced during the decomposition of 2,4-D. [Authors' abstract.]

650. HELMS, C. C., JR., AND PARRIS, G. K.

Transitory effects of 2,4-D on the water-melon plant when absorbed through the roots.

Proc. Fla. St. hort. Soc. for 1950, pp. 144-6, illus. [received Nov. 1952].

Watermelon plants were protected with papier-mâché covers while an amine 2,4-D spray was applied to control the weeds *Richardia scabra* and *Indigofera hirsuta*. Following heavy rains the melon plants showed abnormal growth, due, it is concluded, to 2,4-D absorbed by the roots. Normal growth was resumed about 3 weeks later.

651. ZIMMERMAN, P. W., HITCHCOCK, A. E., AND KIRKPATRICK, H., JR.

Detection and determination of 2,4-D as a contaminant by biological methods.

Contr. Boyce Thompson Inst., 1952, 16: 439-49, bibl. 7, illus.

Methods involving the use of tomato and cotton plants are described for the detection and determination of minute amounts of 2,4-D alone or in mixtures with other substances. Materials were applied to test plants as aqueous solutions, as vapours and in lanolin. The modification of leaves was the most sensitive response. Amounts of 2,4-D as low as 1 p.p.m. were detected in mixtures with 2,4,5-T, DDT, parathion and toxaphene. In practice the typical modification of leaves and other growth responses of many wild species and horticultural types were found useful in detecting the presence of 2,4-D in contaminated sprays or polluted air.

652. HANSEN, J. R., AND BUCHHOLTZ, K. P.

Absorption of 2,4-D by corn and pea seeds.

Agron. J., 1952, 44: 493-6, bibl. 7.

In experiments at Wisconsin Agricultural Experiment Station, Madison, seed samples were placed in solutions of the Na salt of 2,4-D, usually containing 500 p.p.m. of 2,4-D acid. The pH of soaking solutions was an important factor in the amount of 2,4-D absorbed. Both corn and peas absorbed much more 2,4-D at pH 4 than at pH 7. The amount of 2,4-D absorbed was influenced by, but not closely correlated with, the volume of water absorbed. Some hydration was required prior to absorption of 2,4-D, but seeds continued to absorb the herbicide, even to its elimination from the external solution in the case of peas, after maximum water absorption. Total absorption of 2,4-D was greater by peas with seed samples of equal weight, and also greater when seed sample sizes of both species were adjusted in size so that they would absorb equal

volumes of water. Seeds of selected inbred lines of corn differed significantly in 2,4-D absorption, but these differences were not related to varietal tolerance observed in field tests. [From authors' summary.]

653. CARROLL, R. B.

Effectiveness of various chemicals in counteracting 2,4-D toxicity to seedlings.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 21-2.

Among several hundred chemicals tested at the Boyce Thompson Institute, riboflavin counteracted the inhibition of root elongation in cucumber seedlings caused by 2,4-D. When young tomato plants were treated with solutions of riboflavin, ascorbic acid, D-iso-ascorbic acid and sodium dinitro-o-cresol, each in combination with 2,4-D, it was found that riboflavin and sodium dinitro-o-cresol generally reduced the degree of the 5 responses measured while ascorbic acid and D-iso-ascorbic acid generally increased the degree of response of tomato to 2,4-D.

654.* BOUCHET, R. L.

Applications nouvelles du 2,4-dichlorophenoxyacetate de sodium et du dinitrophenate d'ammonium dans le domaine du desherbage sélectif des cultures maraichères et ornementales. (The use of sodium 2,4-dichlorophenoxyacetate and ammonium dinitrophenate as selective herbicides for vegetable and flower crops.)

[*Mim. Pap.*] *13th int. hort. Congr.*, London, 1952, pp. 6, bibl. 6.

The following recommendations are based on 5 years' practical trials at the Experimental Station of La Dargoire, France. For weeding carrots and other vegetables of slow germination, ammonium dinitrophenate should be used as a pre-emergence spray before germination and after the weeds have emerged, at 40 g. per hl. and 8 to 10 litres per acre. Recent trials indicate that the application of only 5 litres of a double strength solution is satisfactory. For weeding carnations, gladioli and peonies post-emergence spraying with 8-12 litres per acre of a solution of sodium 2,4-dichlorophenoxyacetate containing 50 to 125 g. of active principle per hl., in amounts varying with the nature and stage of growth of the annual perennial weeds present, is recommended. This treatment must be given before the formation of flower buds in carnations and gladioli and after flowering in peonies.

655. WILSON, J. S.

Sodium TCA.

Proc. 5th Mtg east. Sect. nat. Weed Cttee 1951, Quebec, 1952, p. 62.

Crop plants, including vegetables, are classified as tolerant, intermediate and susceptible to sodium TCA applications.

656. HAMILTON, R. H., AND ALDRICH, R. J.

The use of certain esters of trichlorobenzoic acid for pre-emergence weed control.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 65-73.

Results have shown that TCB esters when applied pre-emergence at rates of at least 4 lb. per acre give effective

* See note, p. 3.

weed control. In post-emergence applications they appeared somewhat less effective than 2,4-D.

657. FELDMAN, A. W., AND SMITH, A. E.

Phthalamic acid derivatives for pre-emergence weed control.

5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 12-14, bibl. 9.

N-1 naphthyl phthalamic acid and imide selective weed killers are best applied as pre-emergence soil sprays rather than as contact herbicides. They gave practical weed control for over 4 weeks when applied either pre- or post-emergence of crops, including cucurbits, snapbeans, spinach and carrots.

658. POLAND, J. L.

General progress report on field studies with Endothal.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 45-55, bibl. 64.

Summarized information is given on the performance to date of Endothal, trade name for disodium 3,6-endoxohexahydrophthalate. Among the practical aspects of horticultural importance are methods of treatment, lists of susceptible weeds and of crops tolerant to pre-emergence applications, including lima beans (some varieties), spinach, red beet, cauliflower and possibly sunflower, gladiolus, cabbage, peas (canning) and onions. Results of some tests have shown that crops which may be sufficiently tolerant to post-emergence applications include turf, coffee, red beet, cranberry and onion. Other results indicate that ramie, red kidney bean, castor bean and many species of nursery stocks can be successfully defoliated with formulated Endothal.

659. ENNIS, W. B., JR., AND MINARIK, C. E.

Behavior of droplets impinging on leaves of different species.

Suppl. Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, p. 55.

The inclusion of stickers in the herbicidal formulations increases droplet retention by waxy leaves. Deobase, a light oil, and undiluted butyl 2,4-D are also readily retained by waxy leaves, which explains why herbicides containing oils or esters are more effective against certain weeds [and more dangerous to some crops] than aqueous sprays of the salts or alkanol amines of 2,4-D. [See also *H.A.*, 22: 2514.]

Noted.

660.

a ANDERSON, E. D.

Engineering developments and challenges in chemical weed control.

Agric. Engng St. Joseph, Mich., 1952, 33: 482-4, 486, bibl. 3, illus.

b BADENHUIZEN, N. P.

Plant growth-regulators.

Chem. Weed Control in Southern Afr., being *Proc. 1st S. Afr. Weed Control Conf. 1950*, Johannesburg, 1951, pp. 7-11, bibl. 35 [received 1952].

A review of recent work.

- c BRAMBLE, W. C., WORLEY, D. P., AND CHISMAN, H. H.
Control of scrub oak (*Quercus ilicifolia*) and associated woody species with foliage and basal sprays.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 303-10, bibl. 2. On the methods of 2,4,5-T application in Pennsylvania.
- d EGLER, F. E.
Blanket versus selective spraying for brush control on right-of-ways.
5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 141-3.
- e FALLIS, K. E.
Progress report on the control of buckthorn [*Rhamnus cathartica*].
Proc. 5th Mtg east. Sect. nat. Weed Ctee 1951, Quebec, 1952, pp. 125-7.
- f GLOVER, P. M.
The weed problem in plantation crops—weeds in tea.
Plant. Chron., 1952, 47: 535-9.
Effects and control in Assam.
- g GRIGSBY, B. H., AND BALL, C. D.
Some effects of herbicidal sprays on the hydrocyanic acid content of leaves of wild black cherry (*Prunus serotina* Ehrh.).
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 327-30, being *Contr. Dep. Bot. Plant Path. Mich. St. Coll. 52-1*. [See also abstract 573.]
- h HEFER, S.
The use of 2,4-D in chemical weed control and its effect on plants.
Chem. Weed Control in Southern Afr., being *Proc. 1st S. Afr. Weed Control Conf. 1950*, Johannesburg, 1951, pp. 12-14 [received 1952].
- i McMARTIN, A.
Weed control in sugar cane.
Chem. Weed Control in Southern Afr., being *Proc. 1st S. Afr. Weed Control Conf. 1950*, Johannesburg, 1951, pp. 15-19, bibl. 3 [received 1952].
[See also *H.A.*, 21: 1600.]
- j NOLL, C. J., AND ODLAND, M. L.
Weeding of lima beans with pre-emergence applications of herbicides.
Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 97-9.
- k ORCHARD, H. E., AND WARNER, R. L.
Chemicals for weed control.
J. Dep. Agric. S. Aust., 1952, 55: 510-22, 564-70, illus.
- l PETERSEN, H. I.
Årsoversigt for Statens Ukrudtsforsøg 1951. (Annual Report of the Danish Institute for Weed Research for 1951.) [English summary 1½ p.]
Tidsskr. Planteavl, 1952, 55: 723-9.
- m SCHMIDT, H.
Zur Entwicklung der chemischen Unkrautbekämpfungsmittel. (On the development of compounds for chemical weed control.)
NachrBl. dtsh. PflSchDienst, Berlin, 1952, 6: 187-96, bibl. 55.
- n SIMON, E. W.
The relative toxicity of nitrophenols to various organisms.
Ann. appl. Biol., 1952, 39: 416-18, bibl. 7. Toxicity found to increase with increasing nitration.
- o VALLANCE, K. B.
The germination of the seeds of *Rhinanthus crista-galli* [yellow rattle].
Ann. Bot. Lond., 1952, 16: 409-20, bibl. 11.
- p WEED, M. B.
Weed and brush control in industrial areas.
5th Proc. south. Weed Conf., Atlanta, Ga, 1952, pp. 155-8.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(See also 2, 14, 19-22, 30-32, 40, 86, 104, 107-115, 122a, 146, 285a, 358, 1225, 1231, 1378, 1387.)

661. FJELDDALEN, J., AND OTHERS.
Aktuelt i grønnsakdyrkinga. (Topical problems in vegetable growing.)
(Publ.) Norsk. Gartnerforenings Forlag, Oslo, 1952, pp. 46, illus.

The pamphlet includes the following papers:

FJELDDALEN, J.
Kampen mot skadedyr på grønnsakvekster. (The control of vegetable pests), pp. 3-8.
RAMSFJELL, T.
Sopp- og virussjukdommer på grønnsakvekster. (Fungus and virus diseases of vegetables), pp. 9-14, bibl. 21.

PERSSON, A. R.
Kjemiske emner mot ugras i grønnsaker. (Chemical weed control), pp. 15-22.
BREMER, A. H.
Grønssaksortimentet i norske forsøk. (Vegetable variety trials in Norway), pp. 23-6.
ROLL-HANSEN, J.
Desinfeksjon av jord. (Soil disinfection), pp. 27-33, illus.
HVEEM, H.
Produksjonsundersøkelser i grønnsakdyrkinga. (Studies in vegetable production), pp. 34-7.
BERNHARDSEN, G.
Arbeidsstudier. (Labour studies), pp. 38-42.
WATTNE, R.
Arbeidsledelse. (Labour management), pp. 43-6.

- 662.* CHOPINET, R., TREBUCHET, G., AND DROUZY, J.
Tendance de la culture légumière en France et variétés nouvelles. (Tendencies in French vegetable production and new varieties.) [English summary $\frac{3}{4}$ p.] [*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 5.

The results of the war and post-war conditions on French market gardening are discussed. It is suggested that extension for export purposes is well worth consideration. Few new varieties have been evolved lately.

663. BRAUN, O.
Gemüsebau in den Tropen Boliviens. (Vegetable growing in the tropics of Bolivia.) [English summary 5 lines.] *Mitt. Klosterneuburg*, 1952, 2: 199-201.

A settlement of central Europeans in the so-called Yungas of Bolivia, the steep slopes of the Andes towards the Amazon Basin, abandoned their attempts to grow temperate vegetables in the rain forest area, although some types, e.g. carrots, did well on the acid moor soil. Tropical vegetables soon provided acceptable substitutes and the culture of a wild, disease-resistant tomato enriched the diet.

- 664.* HASKELL, G.
Heterosis and adaptability. [*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 9, bibl. 19.

The author defines and reviews the meaning and value of hybrid vigour in a number of common vegetables. He then illustrates the manifestation of the phenomenon in sweet corn.

- 665.* BASSE, H.
Deutsche Gemüse und Obstzüchtungen der neueren Zeit. (Recent development of vegetable and fruit breeding in Germany.) [English summary $\frac{1}{2}$ p.] [*Mim. Pap.*] 13th int. hort. Congr. London, 1952, pp. 14.

The development of German vegetable breeding was decisively influenced by the legislative measures taken in 1934 and later for the promotion of plant breeding. Plant breeding projects were inaugurated on a large scale for the production of new and valuable vegetable varieties. Great success was obtained with peas and beans. Special varieties of peas were bred for the canning industry which prefers wrinkled peas with green seeds. Altogether 23 new varieties of pea are of recent introduction. Noteworthy kidney beans produced have included white seeded stringless varieties. Schreiber has had particular success in breeding anthracnose resistant varieties. Altogether 22 new varieties of kidney bean and 11 new runner beans have come on the market. New varieties of carrot, celery, and radish have been selected. In tomatoes the emphasis has been on bush types, and in cabbage lettuce a new early variety which keeps well has been evolved. Cabbages have been improved in crop and quality. As regards fruit, very comprehensive trials were initiated before 1930 at the Kaiser Wilhelm Institute at Müncheberg. The aims were frost, disease and pest resistant varieties of outstanding quality. As the first results of this work a new early

sweet cherry and a new early plum will be handed over to the grower this year. Further, a new kind of red currant with very long clusters and late ripening has been brought out. Among numerous new strawberries produced, Senga is perhaps the most noteworthy.

666. BANGA, O., AND SNEEP, J.
Veredeling van tuinbouwgewassen in Dene-marken. (Breeding of horticultural crops in Denmark.) [English summary 10 lines.] *Meded. Dir. Tuinb.*, 1950, 13: 289-311, illus., being *Meded. Inst. Vered. Tuinbouwgew.* 23, 1950, pp. 23 [omitted in error from *H.A.*, Vol. 21].

An account is given of the Danish system of conducting variety trials of new vegetable selections and of plant breeding and seed production. Notes are given on some of the more important Danish varieties of horticultural crops, including brassicas, roots, celeriac, tomatoes, apples and strawberries.

667. BANGA, O.
De verdere ontwikkeling van de praktijkproeven volgens het Deense systeem. (The future development of variety trials on the Danish system.) [English summary $\frac{1}{2}$ p.] KOERT, J. L.
De invoering van het Deense systeem bij het selectie-onderzoek van de ui. (The introduction of the Danish system to variety trials with onions.) [English summary $\frac{1}{4}$ p.] BARTEN, D., AND OTHERS.
Algemene discussie over de beginselen, de wijze van werken en de resultaten van de praktijkproeven. (Public discussion on the principles, operation and results of variety trials on the Danish system.) [English summary 1 $\frac{1}{2}$ pp.] *Meded. Inst. Vered. Tuinbouwgew.* 32, 1952, pp. 9-19, 20-3, 34-51.

For the testing of new vegetable selections.

- 668.* BANGA, O.
Denomination and evaluation of varieties of vegetables. [*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 5.

1. Industry demands the exclusive use of recognized variety names. 2. Seed growers and scientists are co-operating in their efforts to standardize such names. 3. By a variety is implied a group of plants which at a given moment forms a unity for cultural use and can be reproduced with sufficiently constant characteristics. 4. In general, varieties of preponderantly autogamous kinds can be identified. Examples are given of the identification of garden beans and tomatoes. 5. In heterogeneous kinds the main difficulty in identifying basic varieties is that there is often no distinct demarcation line between 2 different but related varieties. This can be solved by standardizing the basic varieties between certain limits. Examples from cabbage and red beet are given. 6. In the Netherlands the most important kinds of vegetables are submitted to periodical variety trials for the sake of the standardization of types and names and of the evaluation of the cultural value. The varieties and selections are judged in field

* See note, p. 3.

* See note, p. 3.

trials by committees of vegetable growers, seed growers and officials. The quantitative data are determined by research-specialists. The field trials in the different cultural centres are considered as the only definite proof of cultural value, but in addition attempts are made to develop different kinds of analytical methods to cope with special aspects of the varieties. [From author's summary.]

669. ODLAND, M. L., AND NOLL, C. J.

Vegetable variety trials—1951.

Progr. Rep. Pa agric. Exp. Stat. **67**, 1952, pp. 11, illus.

Such characters as plant uniformity, disease resistance, vigour and fruit type were included in the evaluation of peas, sweet corn, tomatoes, eggplants, beets, rutabagas, cucumbers, carrots and snap beans at State College, Pa.

670. SINGLETON, G.

Varieties of vegetables suitable for freezing.

Proc. Fla St. hort. Soc. for 1951, pp. 144-7.

Varieties of beans, turnip greens, mustard, collards, okra, squash, cauliflowers, peas and strawberries.

671. GRAHAM, T. O., AND SHOEMAKER, J. S.

Vegetable varieties and hybrids.

Bull. Ont. Dep. Agric. **451**, revised 1952, pp. 97, bibl. 23, illus.

Detailed recommendations are made regarding suitable varieties and hybrids of some 40 kinds of vegetables for growing in Ontario. A key to the different types is given in many cases and the characteristics of important varieties and hybrids are described.

- 672.* BATEMAN, A. J.

Problems of isolation in seed growing.

[*Mim. Pap.*] *13th int. hort. Congr.*, London, 1952, p. 1 [summary only in Proceedings].

As a general rule forms within the same species are fully inter-fertile but not those from different species. A notable exception is given by the species *Brassica campestris* (turnip) and *B. napus* (swede), but here the hybrids though freely produced are fairly sterile. Confusion sometimes arises in variable species like *B. oleracea* and *B. campestris*. Isolation between inter-fertile forms can be produced in various ways: 1. A high degree of self-fertilization reduces the chance of intercrossing. 2. Difference in flowering times. This can be very useful in isolating annual and biennial forms of the same species. 3. Moderate distances (100 yards or so) are equally effective for wind and insect-pollinated species. 4. The outermost plants are always subject to the greatest amount of outcrossing. Therefore isolation is improved by increasing the number of plants, by using a compact shape of plot (both measures reduce the ratio of outside plants to the remainder) and by discarding the outer rows. 5. Special considerations in wind-pollinated species: (a) Direction of prevailing wind and wind strength. (b) Use of wind breaks. (c) The danger of a source of contamination is proportional to its size. 6. Special considerations in insect-pollinated species: (a) Danger increases with population density and activity of pollinators, especially in self-fertilizing species. (b) Bees are more reliable than flies. (c) When bees can distinguish varieties they will tend to stay on one or the other. (d) Empty space is a less effective

* See note, p. 3.

barrier than the same distance over another flowering crop. Most effective is a continuous mass of the same species. (e) A large plot, in addition to the effect given in point 4, encourages pollinators to stay in one place. 7. Degree of isolation required. 100% is hardly practicable, and is not necessary. If stock seed is managed properly, commercial seed will not come to harm. Therefore, special care must be taken with stock seed. If contamination of some kind is inevitable it should be of a kind that can be recognized and removed before flowering.

- 673.* HORNE, F. R.

The testing and maintenance of improved strains of vegetables.

[*Mim. Pap.*] *13th int. hort. Congr.*, London, 1952, pp. 13, bibl. 15.

Before critical yield trials can be conducted it is necessary to relate the new stock to established types. In vegetables there are many synonyms and there are also instances in which two or more unrelated types are known in commerce under one varietal name. Agro-ecological considerations make it necessary to test varieties at Trial Stations which provide an adequate range of soil, rainfall, length of day, etc. Spacing and the level of fertility are so important in many crops that special trials may be necessary to test the reaction of the variety. Specific physiological or pathological tests may be necessary to supplement the results of regional trials. The seasonal production curve of varieties and their relationship to established varieties deserve particular consideration in vegetables such as winter cauliflower. As a guide to the more serious rogue types, simple genetical experiments may be valuable. Strain differences in quality may be more important than total yield and the special knowledge of the vegetable salesman is more useful than theoretical considerations. In the multiplication and reproduction of approved strains, vegetative reproduction and self-pollination offer attractive means of maintaining the basic type. It is essential that seed stocks of varieties approved in official trials and extensively recommended by the advisory service should be satisfactory as regards authenticity and purity of type. The quality of stock seed is the principal means of improving the resulting commercial seed stocks. [Author's summary.]

674. SNEEP, J.

Enige ervaringen op het gebied van de zaadteelt. (Some experiments in seed production.) [English summary $\frac{1}{2}$ p.]

Meded. Inst. Vered. Tuinbouwgew. **17**, 1950, pp. 21-31, illus. [omitted in error from *H.A.*, Vol. 21].

MINDERHOUD, A.

Het gebruik van bijen en hommels voor bestuiving in afgesloten ruimten. (Bees and bumble-bees as pollination agents in small cages.) [English summary $\frac{1}{2}$ p.]

Meded. Inst. Vered. Tuinbouwgew., **17**, 1950, pp. 32-9, illus. [omitted in error from *H.A.*, Vol. 21].

Two varieties of leek useful for Dutch conditions, Elephant and Winter Giant, can be recognized by their fine seeds, inferior varieties having coarser seeds. Early bolting in endive was due to late ripening of the

* See note, p. 3.

seeds due to the cool autumn weather, the seed being already vernalized before it was harvested. Hybridization between *Brassica oleracea* and *B. napus* sometimes occurs but can be safely disregarded. For carrying out crosses in glass cages certain bumble-bees have proved useful. This is discussed in Minderhoud's article.

675.* DE VILMORIN, R.

La production des graines de semences en France. (Seed production in France.)

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 11.

A useful account of areas devoted to the production of vegetable and flower seeds in different parts of France.

676. SCHUDEL, H. L.

Vegetable seed production in Oregon.

Bull. Ore. agric. Exp. Stat. 512, 1952, pp. 79, bibl. 14, illus.

Advice, based on research conducted between 1942 and 1950, is given on the growing of some 20 important vegetable seed crops. Recommended herbicides are: pre-emergence dinitro general and light oil; post-emergence—potassium cyanate for onions, sodium chloride for beets, IPC for autumn and winter application to beet, cabbage and onion.

677.* RODRIGO, P. A.

Some studies on the storing of tropical and temperate seeds in the Philippines.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 20, bibl. 13.

This paper presents the results of a 17-year study on the storing of some temperate and tropical seeds under three methods of storing. The study included 10 kinds of vegetables and 11 farm crop seeds; 7 of the vegetable seeds were imported from temperate countries. In both the vegetable and farm crop seeds, whether imported or locally produced, those stored in air-tight containers outlived their corresponding counterpart in the unsealed containers by 190 to over 620%. The life duration of the seeds in air-tight containers varied with the kind of seed. For example, lettuce completely lost its viability in 27 months; cabbage and peanut in 37; cucumber and onion 38; radish, 39; cauliflower, 46; asparagus, 50; egg-plant, 53; soybean, 55; pepper, 65; pechay, 66; corn, 59 to 72; rice, 72 to 88; cowpea, 123, and Yellow tapilan, 138 months; mungo and black tapilan were still germinating, albeit slightly, after 201 months in storage. An interesting phenomenon was observed in the behaviour of most of the seeds stored in sealed containers. To a lesser or greater degree, they invariably manifested a striking evidence of renewed vigour in their viability after they had become critical in their germination as illustrated by the cauliflower and the black tapilan seeds. [Author's summary.]

678.* BRETT, C. C.

The influence of storage conditions upon the longevity of seeds, with special reference to those of root and vegetable crops.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 14, bibl. 7.

The importance of storage under optimum conditions is stressed. Factors, internal and external, which affect viability are detailed. The greatest loss occurs when two

or more factors operate at their maximum "germination depression" values. To ensure maximum and longest retention of viability the seed should be in sound condition, well harvested, of high initial germination and of relatively low moisture content, while storage conditions should provide a relatively low but stable temperature and relative humidity.

679.* WEIBULL, G.

The cold storage of vegetable seed and its significance for plant breeding and the seed trade.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 8, bibl. 11.

The present investigation [at Nynäshamn and Landskrona, Sweden] indicates the possibility of using a temperature of -20°C . for the long-term storage of certain vegetable and flower seeds. Onion (*Allium cepa*) and chive (*Allium schoenoprasum*) showed acceptable germination even after four years of storage at -20°C .: parsnip (*Pastinaca sativa*), red beet (*Beta vulgaris* var. *cruenta*), celeriac (*Apium graveolens*) and carrot (*Daucus carota*) still showed a germination-figure after two years storage at -20°C . equal to the original germinating percentage. Storage at $\pm 0^{\circ}\text{C}$. and with 90% relative humidity, and finally under normal conditions, that is $+5^{\circ}\text{C}$. to $+20^{\circ}\text{C}$. and 70%-80% relative humidity, gave considerably lower figures, and for onion and chive after four and two years respectively a useless product. A certain reduction in the rate of germination was noticed after four years' storage at -20°C . in onion seed, after three and two years in chive and after two years in parsnip. Regarding flower seeds, *Callistephus*, *Delphinium hybridum*, *Kochia* and *Myosotis silvatica* have given favourable results. The cost of storage at -20°C . will not be prohibitive for certain vegetable and flower seeds, for stock-seed and probably for forest seeds where good seed-crops are scarce. Long-term storage will be of great help in work concerning the breeding, testing and control of new varieties and strains. [Author's summary.]

680. RUGE, U.

Über die Steigerung der Keimfähigkeit alten Saatgutes mit Hilfe von Äthylenchlorhydrin. (Improving the germination capacity of old seed by means of ethylene chlorhydrin.)

Angew. Bot., 1952, 26: 162-5, bibl. 6.

At concentrations of 10^{-6} – 10^{-12} , according to kind of seed and variety, ethylene chlorhydrin considerably improved the germination capacity of old vegetable and other seed as compared with pure water. With a certain spinach variety, for instance, the germination percentage on filter paper in Petri dishes was raised from 23.5 to 50. Under field conditions seed of the same variety, after soaking in an ethylene chlorhydrin solution, showed an improvement of 70%.—Hochschule für Gartenbau, Hanover.

681. JACKS, H.

Seed disinfection. III. Effect of seed dressings applied at different concentrations on emergence of vegetable seedlings.

N.Z. J. Sci. Tech., Sect. A, 1952, 34: 202-5, bibl. 2.

* See note, p. 3.

* See note, p. 3.

Cuprocide, Spergon, Panogen, thiram, ferbam, Dow 9B, and 36 L in various dosages were applied as seed dressings to several vegetable seeds to determine effect on emergence. Optimum dosages, as measured by percentages emergence and expressed as percentages of seed weight, varied with the material and different seeds treated. These optimum dosages, omitting reference to materials which were not effective, were: (1) Lettuce: ferbam at 0.25 and all other materials at 0.5% of seed weight. (2) Pea: 36 L at 0.063, thiram at 0.125, ferbam and Dow 9B at 0.5, and all other materials at 0.25%. (3) Bean: Spergon and Panogen at 0.25, ferbam at 0.5, and all other materials at 0.125%. (4) Beet: Panogen, Dow 9B, and 36 L at 0.5, and thiram at 1.0%. (5) Turnip: 36 L at 0.25%. (6) Tomato: Panogen at 2.0, and all other materials except Cuprocide at 1.0%. (7) Celery: ferbam at 0.5%. [From author's summary.]

682. JACKS, H.

Seed disinfection. IV. Effect of seed dressings, applied separately or as mixtures, on emergence of certain vegetable seeds.

N.Z. J. Sci. Tech., Sect. A, 1952, **34**: 206-8, bibl. 1.

The application of mixtures of seed protectant substances [listed in abstract above] to lettuce, pea, turnip and beet seeds sown under glass or in the open showed no benefit over their separate use.

683. POTTER, F. G.

The forcing of early vegetables.

J. roy. hort. Soc., 1952, **77**: 371-7, illus.

Early vegetables are protected by Dutch lights and cold frames, by hot beds or by cloches. Notes are given on the methods of forcing carrots, lettuce, cauliflower, radishes, turnips, peas, beans, cucumbers, melons, endive, sweet corn, marrows and some brassicas. Suitable varieties of each species are suggested.

684. ST[ENDER, J. A.].

Koolzuurdosering in diffusiedichte kas. (Carbon dioxide concentration in an air-proof glasshouse.)

Jaarversl. Inst. TuinbTech. Wageningen, 1951, pp. 25-6.

It was found that in an airtight glasshouse the carbon dioxide level could easily be raised to, and maintained at 3%. Tomatoes, french beans, leeks, beet, strawberries, antirrhinums, salvias and *Viola cornuta* tolerated this high concentration without damage. Salvias and violas gave excellent results and tomatoes had an exceptionally good flavour. Some damage occurred which was probably due to SO₂.

685. CORNELL DEPARTMENT OF VEGETABLE CROPS AND GENEVA DIVISION OF VEGETABLE CROPS.

Fertilizer recommendations for the commercial production of vegetables and potatoes.

Ext. Bull. Cornell agric. Exp. Stat. **855**, 1952, pp. 6.

In addition to fertilizer recommendations for a wide variety of vegetables on different soils, this bulletin contains advice on liming, manuring, trace element supply, side dressings of fertilizer in addition to those applied at planting time, placement, and the use of starter solutions for transplanted crops.

686. SUGIYAMA, T., IWATA, M., AND SHICHIJO, T.

Hunger signs in vegetable crops. II. [Japanese, with English summary $\frac{3}{4}$ p.]

J. hort. Ass. Japan, 1951, **20**: 89-97, bibl. 26, illus.

Deficiency symptoms in tomatoes, radishes, cabbages and onions, determined in nutrient cultures, are described for N, P, K, Ca, Mg, S, Fe and B. Plant reactions and analyses suggest that with cabbage K, Mg and Ca are less essential than N, P and S. Symptoms of Ca, B and Fe deficiency were most marked in younger portions of the plants, from which it would appear that these elements are not so readily translocated as others from older to younger parts of the plants.

687.* HEWITT, E. J.

The importance of molybdenum in the nutrition of horticultural plants.

[*Mim. Pap.*] *13th int. hort. Congr.*, London, 1952, pp. 10, bibl. 41.

Molybdenum is the most recently discovered plant micronutrient and has been studied at Long Ashton since 1947. It is of particular importance for brassicas and lettuce. At least 30 higher plants have shown the need of molybdenum in sand or water cultures. Those with high requirements include cauliflower, brussels sprouts, savoy cabbage, swede and other brassicas, lettuce, tomato and beet. Legumes, cereals and grasses are less sensitive. Molybdenum deficiency is associated with soil acidity where cauliflower and broccoli show "whiptail" and lettuce may fail, whilst "scald" of beans may occur when molybdenum-deficient seed is used. The "whiptail" syndrome has been reproduced in sand cultures at Long Ashton by growing plants from seed with adequate nitrate and 0.00005 p.p.m. Mo. Whiptail effects also develop with other nitrogen sources. When more severe, deficiency symptoms are mainly leaf cupping, chlorosis, wilting and withering of older leaves. Brassicas are exceptional in showing the two types of symptom. Plants normally contain 1-5 p.p.m. Mo in dry matter, and 0.01-0.1 p.p.m. when deficient, but may accumulate 1,000 p.p.m. without apparent injury. Molybdenum profoundly affects biochemical status. Deficient plants have less ascorbic acid, sugars and reducing activity. Glutamic acid is less, irrespective of nitrogen source, but arginine may accumulate with urea. Quality may, therefore, be affected as well as yield. [Author's summary.]

688. HEWITT, E. J., AND BOLLE-JONES, E. W.

Molybdenum as a plant nutrient. II. The effects of molybdenum deficiency on some horticultural and agricultural crop plants in sand culture.

J. hort. Sci., 1952, **27**: 257-65, bibl. 21, illus.

A range of crops, other than brassicas, were grown in sand culture to test their response to molybdenum deficiency; they included tomato, lettuce, garden pea, dwarf bean, broad bean, celery, and some agricultural crops. Typical symptoms included grey tinting of foliage, leaf wilting, curling, withering, scorching and (in some crops only) effects suggestive of low nitrogen status. In all instances older and expanding middle leaves were affected first and showed most severe symptoms. This was in contrast to effects peculiar to *Brassica* crops [see abstract 712]. Susceptibility to molybdenum deficiency

* See note, p. 3.

varied considerably. Lettuce, tomato and sugar beet were highly susceptible and were killed in a few weeks. Clovers, lucerne and cereals were less susceptible. Grasses and large seeded legumes were generally least susceptible. In all crops tested in 1950 (where advanced technique was used) and in most tested in 1948, molybdenum deficiency reduced growth. Molybdenum deficiency resulted in accumulation of nitrate in the tissues and in higher osmotic pressure in stomatal guard cells. Some of the implications of relative susceptibility and of the visual symptoms are discussed in relation to the role, distribution and availability of molybdenum in crops. [From authors' summary.]—Long Ashton Research Station.

689.* MAAG, R.

La méthodologie de la protection des plantes en horticulture. (New plant protection methods for flowers and vegetables.)

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 8.

The author traces the growth of preventive plant pest and disease control in Switzerland in recent years, giving as examples the regular use in the glasshouse of sprays based on derris and of fumigant cartridges of lindane and parathion. A monthly spraying of a mixture of derris and copper carbonate proves efficacious against fungous infection of begonias and roses in the open. Parathion solves the nematode problems of chrysanthemum, phlox and hydrangeas. Dithane will deal with rusts, and substances based on lindane and chlordane with soil pests.

690.* SMITH, K. M.

Some virus diseases of vegetables and ornamental plants.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 4.

The two plant viruses of the greatest importance to the British horticulturist are the cucumber mosaic and tomato spotted wilt viruses. Both of these are insect transmitted, the first by aphids and the second by thrips, and both have an extremely wide host range. This host range includes many perennial plants such as dahlias, chrysanthemums, lilies, etc., which act as sources of infection for annual plants like the tomato, cucumber and many others. The cabbage black ringspot virus is widespread and causes severe damage to broccoli and cabbage plants. In addition it produces diseases on stocks and wallflowers. It also is spread by aphids. One of the most important tomato viruses is tomato mosaic virus, which is one of the tobacco mosaic viruses, and is spread mechanically. It is extremely infectious. Others are the *Tropaecolum* viruses and those which cause break in tulip and mosaic in chrysanthemum. [From author's summary.]

691.* OGILVIE, L.

Recent developments in vegetable diseases in Great Britain.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 5, bibl. 40.

This paper gives a short summary of some of the more important developments in vegetable diseases (apart from those of the potato) during the war period and subsequent years.

* See note, p. 3.

692. BLUMER, S., AND HARDER, A.

Versuche mit pathogenen Bodenpilzen.

(Experiments with pathogenic soil fungi.)

Landw. Jb. Schweiz, 1952, 66: 617-18.

Soil sterilization kills not only pathogenic fungi but also their antagonists, such as *Trichoderma viride* and *Penicillium expansum*. An invasion of sterilized soil by *Rhizoctonia solani* or *Moniliopsis adersholdii* is therefore more devastating than an infection of untreated soil. In an experiment the germination percentage of red cabbage seed in an unsterilized soil inoculated with *Rhizoctonia solani* was 86.2 as against 55 in sterilized soil, the corresponding figures for black leg in the seedlings being 6% and 29% and for the dry weight of the seedlings 9.3 and 2.0 g. respectively. Inhibition of the fungus by culture filtrates of *Penicillium expansum*, however, was not achieved.—Wädenswil Research Station.

693. THE FUNGICIDE COMMITTEE OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY.

1950 summary of results of fungicide tests on crops other than fruit trees.

Plant Dis. Repr., 1952, Suppl. 210, pp. 3-19.

This report summarizes results of disease control trials on vegetables, ornamental plants and shade trees, and miscellaneous plants (including tobacco), and of soil fumigation tests against nematodes. Many of the newer synthetic organic preparations are mentioned.

694. NETTLES, V. F.

Effect of soil fumigants on yield and quality of vegetables.

A.R. Fla agric. Exp. Stat. for 1951, p. 84.

In trials conducted at Gainesville, D-D applied broadcast gave significantly larger total yield and yield of No. 1 and No. 2 grade tomatoes than Dowfume W.40. No difference in yield was observed from the addition of 2% soluble Mg to the fertilizer, nor from the amount of K used. Ammoniacal N increased yield of No. 2 grade and total yield. In another test row-application of Dowfume W.40 increased the total yields of tomatoes and cucumbers. Yields of Contender beans grown in soils fumigated by both D-D and Dowfume W.40 were increased irrespective of the method of application. Plots fertilized with ammoniacal N produced more beans than those receiving a mixture of ammoniacal and nitrate N, and this mixture was better than nitrate N alone.

695. OTEIFA, B. A.

Potassium nutrition of the host in relation to infection by a root-knot nematode *Meloidogyne incognita*.

Proc. helm. Soc. Wash., 1952, 19: 99-104, bibl. 12.

Data are presented which indicate that infection with the root-knot nematode affected the mineral content and physiology of tomato and lima bean plants, and that the damage caused by the nematode may be reduced by increasing the level of K supplied to the plants.

696. REYNOLDS, H. T., ANDERSON, L. D., AND SWIFT, J. E.

Acaricide dusts on vegetable and field crops in southern California, 1949-1950.

J. econ. Ent., 1952, 45: 359-65, bibl. 2, being Pap. Calif. Citrus Exp. Stat. 715.

Fourteen acaricide dusts applied by two-nozzle rotary hand dusters were tested for effectiveness in controlling 3 mite species on different crops: *Tetranychus multisetis* on snap (pole) beans, lima beans and water-melon vines; *T. bimaculatus* on water-melon vines and a clover; and *T. atlanticus* on alfalfa and cantaloupes. The compound 2-(*p*-tert-butyl-phenoxy) isopropyl 2'-chloroethyl sulphite (Aramite) gave excellent initial and residual control of all 3 mites and was outstandingly better than the other materials tested against *T. bimaculatus*. In general, of the 3 species *T. atlanticus* appeared to be the most susceptible to the control measures used and *T. bimaculatus* the most resistant. Flavour tests on beans dusted with 6 acaricides showed that only pods from plants treated with 2,4-dichlorophenyl benzene sulphinate for the second time 15 days before harvest had an off-flavour after cooking.

697. WILSON, J. W.

Preliminary investigations of systemic insecticides.

Proc. Fla. St. hort. Soc. for 1951, pp. 117-19, bibl. 6.

Factors involved in the use of systemic insecticides are discussed. In a trial on cabbage in Florida, schradan (octamethyl pyrophosphoramidate) applied in late February and early March gave better kill of the aphid *Brevicoryne brassicae* than parathion or TEPP. Schradan residues were less than 2 p.p.m. in mid-April and early May.

698. EHRENHARDT, H.

Untersuchungen über die Wirkung des Gamma-Hexa auf Kulturpflanzen bei verschiedenen Anwendungsverfahren. (Experiments on the action of gamma-hexane on crop plants from different application methods.) *Mitt. biol. Zentralanst. Berlin*, 1952, 74: 116-22, from abstr. in *Soils and Ferts*, 1952, 15, No. 1449.

In pot experiments with lettuce and cauliflower, γ -hexane (containing 1.3% of the active principle) was mixed in different quantities with humus-rich soil. Lettuce tolerated up to 2 kg./cu.m. and cauliflower up to 5 kg./cu.m. Vine cuttings showed the same degree of tolerance as lettuce. Roots of other lettuce plants were dipped into a paste made from loam and the above BHC product. For 1 l. of loam 10 g. of insecticide checked wireworm damage, 10-25 g. was harmless to the plants, 50-100 g. retarded their growth, and greater amounts were very harmful. Similarly treated apple cuttings planted in cockchafer-infested soil tolerated 50 g. per l. of loam but at and above 100 g. their root development was severely checked. Cockchafer-grub damage was controlled by 10 g. Vines in pots showed increasing inhibition of growth when the pots were dipped in an emulsion of the 7.5% γ -isomer at concentrations of 0.2, 0.3 and 0.5%, but benefited from a 0.1% concentration.

699. WILSON, J. W.

Toxic insecticide residues of vegetables.

Proc. Fla. St. hort. Soc. for 1950, pp. 95-8, bibl. 6 [received Nov. 1952].

Preliminary studies on samples of cabbage, peppers [capsicums] and celery confirm results obtained elsewhere which indicate that parathion residues become negligible when 13 days elapse between the last applica-

tion and harvest. With celery treated with toxaphene, samples given the usual commercial washing had much lower residues than unwashed samples.

700. HERVEY, G. E. R., AND GUNKEL, W. W.

Low gallage spraying of vegetable crops.

Bull. N.Y. St. agric. Exp. Stat. 753, 1952, pp. 40, illus.

A detailed description is given of a tractor-mounted low-volume sprayer with a 12 ft. boom with which satisfactory control of certain insects on vegetable crops was obtained. Tentative volumes and pressures are 20 gal. per acre and 80 lb. per sq. in. The advantage of low volume application lies in reduction of costs.

701. SMITH, W. H.

Vegetable washing.

Agriculture, Lond., 1952, 59: 239-41, illus.

The results of a survey on the extent and methods of washing vegetables in England and Wales are summarized. The extent varies greatly in different parts of the country. Main crop carrots and bunched salad vegetables are the types most commonly washed. The most usual method is to lay the vegetables on a concrete floor and spray them with a hose. Where machines are used, 5 types, some being home made, are mentioned, the commonest being a horizontal rotary drum through which the vegetables pass, being washed by water from taps. A further stage of the investigation is in progress, which is aimed at determining in what way washing affects subsequent keeping quality.—D.S.I.R. and other organizations.

Abelmoschus.

702. PAL, B. P., SINGH, H. B., AND SWARUP, V.

Taxonomic relationships and breeding possibilities of species of *Abelmoschus* related to okra (*A. esculentus*).

Bot. Gaz., 1952, 113: 455-64, bibl. 18, illus.

Five species of *Abelmoschus* (*A. esculentus* (the cultivated species), *A. ficulneus*, *A. manihot*, *A. manihot* var. *pungens* and *A. tuberculatus* n. sp.) were studied morphologically and in interspecific hybridization. The new species *A. tuberculatus* Pal et Singh is described. The view that these species constitute a taxonomic unit distinct from the genus *Hibiscus* is confirmed. Although only *A. esculentus* is of commercial importance, it was thought that the wild species might be useful for breeding purposes, as all except *A. tuberculatus* continue to flower and fruit at a time of year when it is difficult to grow the cultivated variety. *A. tuberculatus* is almost immune to attacks of the fruit borer (*Earias insulana*) and to mosaic, and all have vitamin C contents as high or higher than the cultivated species. The total sterility of the F_1 hybrids, however, has caused a setback in the breeding programme.—Indian agric. Res. Inst., New Delhi.

Asparagus.

(See also 519, 845p.)

703. DEPARDON, L., AND BURON, P.

Nature géologique et composition physique des sols à asperges. Fumure. (The geological nature and physical composition of asparagus soils. Manuring.)

Bull. Ass. fr. Ét. Sol., 1952, No. 29, pp. 30-6, from abstr. in *Jardins Fr.*, 1952, 6: 195.

Asparagus requires a very permeable soil to a depth of 50 cm., 70% of which should consist of coarse sand. After reviewing the requirements of asparagus, the authors recommend the following manurial treatment for neutral soil: 10,000 kg. manure, 400-500 kg. nitrate of lime 13%, 150 kg. potassium chloride. Superphosphate should be added when required.

704. GHISLENI, P. L.

La concimazione dell'asparago. (Manuring asparagus.) [English summary 5 lines.] *Riv. ortoflorofruttic. ital.*, 1952, 36: 147-57, bibl. 60.

The author reviews literature on this vexed question and draws the following conclusions: (1) organic manures—farmyard manure in particular is beneficial but there is some doubt about its economic advantages compared with mineral fertilizers and also about the effect of its exclusive use on weed growth; (2) K fertilizers—K chloride appears to be more suitable than K sulphate, probably due to the beneficial action of the chloride ion; (3) N fertilizers—Na nitrate appears to be more effective than sulphate of ammonia, but opinion is divided regarding the time of application; (4) sodium fertilizers—sodium chloride increases yield more than sodium carbonate but is less suitable from the point of view of weed growth; (5) complete fertilizers—the divergence of opinion is very marked.—Turin University.

705. DI CARO, S.

Il "mal vinato" con special riguardo a quello dell'asparago. (Violet root rot with special reference to asparagus.) [English summary 10 lines.] *Ann. Sper. agrar.*, 1952, 6: 1389-97, bibl. 10, illus.

The characters of the disease on asparagus and the morphology and biology of the causative fungus, *Rhizoctonia violacea*, are described. Recommendations for control are the removal and burning of infected plants and wild hosts, avoidance of excessive organic manuring (since acid conditions favour the fungus), a long rotation of crops (soil can remain infected for as long as 10 years) or soil sterilization.

706. HASSEBRAUK, K., AND VON HORN, A.

Untersuchungen über die Bekämpfungsmöglichkeit des Spargelrostes (*Puccinia asparagi*) mit Fungiziden. (The control of asparagus rust with fungicides.) *NachrBl. dtsch. PflSchDienst., Braunschweig*, 1952, 4: 100-3, bibl. 8.

Three sprayings from the end of May to the end of June with Cuprenoxon and GB48 on one- and two-year-old asparagus plants resulted in a slight reduction in rust, but the application of Cuprenoxon to three-year-old plants was ineffective.

707. KEPNER, R. A.

Harvester for green asparagus. *Calif. Agric.*, 1952, 6(10): 7-9, illus.

The results of tests in 1952 with a tractor-mounted asparagus harvester indicate that the process is feasible both mechanically and economically. In 5 tests, each of several runs, over 80% of all spears over 4 in. long were recovered, and it is believed that recovery could be increased to about 90%. It is estimated that a full-sized machine operating with 2 men for 10 hours a day at

2½ m.p.h. could cover at least 80 acres in 5 days at a cost not exceeding \$15 per acre per annum. Allowing for reduced yields as compared with hand cutting this would leave a difference of \$65 per acre in favour of mechanical harvesting.

Brassicas.

(See also 845t, u, v, 846e, g.)

708. PERSSON, A. R.

Forsøk med norske sorter og stammer i høst- og vinterkvitkål 1947-50. (Trials of varieties and strains of autumn and winter cabbage 1947-50.) [English summary ½ p.] *Forskn. Landbruk.*, 1952, 3: 1-29, bibl. 6, illus.

These comparative trials, involving 36 cabbage strains, were carried out at the Vegetable Research Station, Kvithamar (63° 28') and at the Institute of Vegetable Crops of the Agricultural College of Norway, Ås (59° 40'). The characteristics of the varieties tested are described and the results of their evaluation are tabulated in detail. Fourteen varieties, which were awarded a first-class certificate, are illustrated by photographs. Temperature appeared to be the most important environmental factor in the north and rainfall in the south.

709. DIKSHIT, N. N., AND SINGH, U. P.

Vernalisation of cabbage seeds (*Brassica oleracea* var. *capitata*). *Curr. Sci.*, 1952, 21: 249-50, bibl. 2.

Among cabbage varieties which do not normally produce seed in the plains of Uttar Pradesh is Pocha's Early Large Drum-head. Seeds of this variety provided with moisture at 50% by weight of seed and vernalised for 4 weeks at 32° F. produced 7 plants which formed seeds out of a total of 16 raised. Plants from seeds vernalized at 45° F. and from untreated seeds failed to produce flowers.

710. HO[UTER, P. J.], AND WE[GENAAR, C.].

Vergelijking van kartonnen potten met gewone stenen potten voor het opkweken van bloemkoolplanten. (A comparison of cardboard pots with clay pots for raising cauliflower plants.) *Jaarversl. Inst. TuinbTech. Wageningen*, 1951, p. 21.

Cauliflower plants were raised during the winter in cold frames in the following types of pot: strawboard, hard cardboard, grey cardboard, impregnated cardboard and clay. Half the pots were plunged in the soil and half were left on the surface. In each group half were given extra N in the compost. It was found that extra N improved the quality of the plants in the cardboard pots but not of those in the clay pots. The largest plants were obtained from the clay pots, followed by the grey cardboard, hard cardboard, strawboard and impregnated cardboard, in that order. The plunged cardboard pots were in a better condition at planting time than those left on the surface of the soil, the strawboard pots being the most decomposed and the grey cardboard the least. The root systems of the plants in the clay pots were the best.

711. DADYKIN, V. P.

The application, to the aerial parts of plants, of nitrogenous fertilizers under cold soil conditions. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 79: 529-31, bibl. 10.

Results of experiments with cabbages showed higher yields when nitrogenous fertilizer was applied to the aerial parts of the plants by spraying than by applications to the soil. It is suggested that the application of fertilizers to the aerial parts of plants is a promising means of manuring crops in the northern regions of the U.S.S.R. where cold soils are unfavourable for absorption through the roots.

712. HEWITT, E. J., AND BOLLE-JONES, E. W.
Molybdenum as a plant nutrient. I. The influence of molybdenum on the growth of some brassica crops in sand culture.

J. hort. Sci., 1952, 27: 245-56, bibl. 29, illus.

An efficient sand-culture technique for the production of acute molybdenum deficiency in plants has been developed. A survey of the visual effects of molybdenum deficiency was carried out over three years with seven brassica crops. All were shown to be highly sensitive to molybdenum deficiency. Relative susceptibility to initial deficiency, ability to recover and effect on ultimate yield differed somewhat for the crops examined. A provisional order of decreasing susceptibility in sand culture based on these criteria was as follows: brussels sprouts, swede, cauliflower, rape, Hungry Gap kale, Marrowstem kale, savoy cabbage. Growth was greatly reduced by deficiency, often to about 4% or less of control plants, but toxicity (to cauliflower) was not marked at 10 p.p.m. Mo. Visual symptoms in early stages were similar for most species and included mottling, scorching, wilting and frequently leaf-cupping of older and middle leaves. Symptoms in later stages often showed a marked change, especially after partial recovery, and developed mainly in young leaves. Malformations, or death of the growing point, were recorded in cauliflower, swede, savoy cabbage, Marrowstem kale and Hungry Gap kale, but not in rape or brussels sprouts. The relation of these effects to the field disorder known as whiptail in cauliflower and broccoli is discussed, and possible contributory factors are reviewed in relation to the role of molybdenum in plant growth. [From authors' summary.]—Long Ashton Research Station.

713.* MILES, H. W.

Aspects of pest control in brassica crops.

[*Mim. Pap.*] 13th int. hort. Congr. London, 1952, pp. 7, bibl. 6.

Increasing knowledge of the details of the biology and behaviour of two important pests of brassicas, cabbage root fly, *Erioischia brassicae* Bche., and cabbage stem flea-beetle, *Psylliodes chrysocephala* L., reveal the part played by brassica crops in maintaining these insects during the periods when their capacity for harm is restricted. Accurate observations on cabbage root fly over five years have shown the date of the beginning of spring egg-laying to vary from 14 April to 2 May and the beginning of the peak period of egg-laying from 20 April to 19 May. The greatest success in controlling the fly is likely to follow the application of calomel or BHC dust to cover these periods. Subsequent genera-

tions of the flies are shown to be far less important than the spring generation. The value of irrigation in helping the plants to tolerate as high infestation as that indicated by 500 eggs per plant or over 80 fully grown larvae is stressed. *Psylliodes chrysocephala* L. has been shown to be capable of prolonged egg-laying, that in individual cases has included two autumn periods and the intervening spring period, and nearly 1,000 eggs per beetle have been recorded. With such a long oviposition period the chances of the survival of the species are great and the achievement of artificial control appropriately more difficult. Control measures include the use of BHC dust on seedlings in autumn and proper control of cruciferous weeds and the waste materials from brassica crops. The work at Wye College is showing how sensitive insects act to variations in local conditions and how important it is that these, and the whole cropping complex of an area, should be considered when control measures are being developed. [Author's summary.]

714. LOCHNER, E. H. W.

Preliminary experiments with systemic insecticides for the control of the cabbage aphid (*Brevicoryne brassicae*, Linn.).

Sci. Bull. Dep. Agric. S. Afr. 333, 1952, pp. 14, bibl. 2.

Replicated experiments conducted on the cabbage aphid, *Brevicoryne brassicae*, at Pretoria with Pestox 3, 14, 15 and 16 were designed to study the initial and residual efficacy and the translocation of all 4 systemic insecticides when applied to the leaves and of Pestox 3 when applied to the soil. Potted cabbage plants at the 6-leaf stage were used and were kept out of doors under natural conditions except during heavy rain. The insecticides were used as 4% aqueous solutions at 0.2 ml. per plant in leaf applications (on the under surface only, the aphids being placed on the upper surface), and at 2.5, 5.0 and 10.0 ml. per plant in soil applications. *Leaf application results.* Pestox 14 and 15 showed equal initial efficacy followed by 16 and 3. All showed a marked drop in residual efficacy after 10 days but 14 was superior to the others. All were translocated more freely to old than to young leaves; the order of merit for initial efficacy up to the 6th day was 16, 14, 15, 3 for old and 3, 14, 15, 16 for young leaves, and for residual efficacy 14, 15, 3, 16. *Soil application results.* The initial efficacy of Pestox 3 and its residual efficacy for the first 20 days were in direct relation to the size of dose. A comparison is made between translocation results in soil and in leaf applications.

715. BONNEMAISON, L.

Morphologie et biologie de la punaise ornée du chou (*Eurydema ventralis* Kol.). (Morphology and biology of the cabbage ornate bug (*Eurydema ventralis* Kol.).)

Ann. Épiphyt., 1952, 3: 127-272, bibl. 218, illus.

The nomenclature, pigmentation, morphology, physiology, life cycle, habits, parasites and predators of the cabbage bug are discussed. Control methods suggested are crop rotation, the destruction of cruciferous weeds, the use of cardboard or metal-foil trays for collecting copulating adults shaken from the plant, and the application of insecticides such as diethyl and para-nitrophenyl thiophosphates, BHC, chlordane and rotenone, as dusts or sprays.

* See note, p. 3.

716. BUHL, C.
Der grosse Kohltriebrüssler (*Ceuthorrhynchus napi* Gyll.), ein bisher im Glückstädter Gemüseanbaugesamt unbekannter Schädling. (The large cabbage stem weevil (*Ceuthorrhynchus napi*), a hitherto unknown pest in the Glückstadt vegetable-growing district.) [English summary 9 lines.]
Z. PflKrankh., 1952, 59: 326-34.
Ceuthorrhynchus napi, previously unknown in the Glückstadt district, has been found causing serious damage to stems of cabbage plants in the flowering stage. Its life cycle and its larvae are described and its parasite, *Thersilochus gibbus*, is mentioned. Hexa preparations and phosphoric acid ester have given good control.
717. CROWELL, H. H.
Cabbage seedpod weevil control with parathion.
J. econ. Ent., 1952, 45: 545-6, being *Tech. Pap. Ore. agric. Exp. Stat.* 725.
Results are presented indicating that late applications (after bloom) of 2% parathion may give satisfactory control of cabbage seedpod weevil, *Ceutorrhynchus assimilis*, under Willamette Valley conditions without seriously affecting bee populations.
718. MILES, M.
Further observations on the biology of the cabbage root fly, *Erioischia brassicae* Bché.
Ann. appl. Biol., 1952, 39: 385-91, bibl. 7.
Observations on numbers of eggs laid by the summer and autumn generations and on the numbers and condition of puparia on attacked plants at the end of the season suggest that natural factors are effective in limiting the population of *Erioischia brassicae*. 1½% tar-oil winter wash killed the eggs of the pest and repelled gravid females for a week. Laboratory tests with BHC indicated that it had no adverse effect on the eggs but was larvicidal.
- 719.* WRIGHT, D. W.
Soil insecticides for the control of cabbage root fly (*Erioischia brassicae* Bché) and carrot fly (*Psila rosae* Fab.).
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 5.
A discussion of the effects of gamma and crude BHC, chlordane and parathion. The danger of tainting by BHC is noted.
720. ENDRIGKEIT, A.
Versuche zur vorbeugenden Kohlfiegenbekämpfung bei Kohlsetzlingen durch Wurzelbegiftung mit Schwermetallverbindungen und Kontaktinsektiziden. (Investigation of the preventive control of the cabbage fly by root treatment of seedlings with heavy metals and contact insecticides.) [English summary ½ p.]
Z. PflKrankh., 1952, 59: 209-20, bibl. 29.
Protection of cabbage plants from attacks of cabbage root maggot (*Chortophila brassicae*) was obtained for 2 to 3 months by dipping their roots in a soil suspension (5 parts clayey marsh soil and 1 part water) mixed with a contact insecticide, the preparation being less effective in water than in the soil suspension. The ester of E605 is effective as an emulsion but not as a dust. Gamma-Streu-Nex, a BHC compound, at 10-20 g./l., gave protection for 3 months. About 10 litres of a soil suspension are necessary for 1,000 plants. HgCl₂, Cu and As preparations were ineffective.
721. ENDRIGKEIT, A.
Weitere Versuche zur vorbeugenden Bekämpfung der Kohlfiege (*Chortophila brassicae* Bché.) bei Kohlsetzlingen mit Kontaktinsektiziden im Wurzeltauch- u. Saatbeetbegießungsverfahren. (Further experiment on the prophylactic control of the cabbage root fly (*Chortophila brassicae* Bché) with contact insecticides applied to the seedlings as root-dips and seedbed sprays.) [English summary ½ p.]
Z. PflKrankh., 1952, 59: 248-55, bibl. 11.
Gamma-Spritz Nexit und Muttanin (DDT-BHC mixture) gave good protection used at 5 g./l. as root dips. Other materials and methods tested were unsuccessful.
722. CLARK, P. J., AND OTHERS.
Note on D.D.T. residues on cabbages.
N.Z. J. Sci. Tech., Sect. A, 1952, 34: 226-7, bibl. 3.
DDT residues on cabbages treated 14 and 21 days earlier with 2% DDT dust and 0.1% DDT sprays were below the permitted limit of 7 p.p.m. As a 1% dust or a 0.05% spray give adequate caterpillar control and leave still smaller residues, their use to within 2-3 weeks of harvest can be recommended.
723. KOTT, V.
Rozložení a pohyb vitaminu C v květku. (The distribution and movement of vitamin C in cauliflower.) [English and Russian summaries ½ p. each.]
Sborn. Čes. Akad. Zeměd., 1951, 24: 341-8, bibl. 8, illus.
The distribution and movement of vitamin C were studied in the cauliflower varieties R.H.91-Hansen and Erfurt Dwarf. Levels of l-ascorbic acid were analysed in the various parts of the curd during growth and at regular intervals during storage under different conditions. The results are tabulated. The movement of l-ascorbic acid was greatest in heads stored at 25° C. and 90% humidity after 72 hours. An intense concentration occurred near the cut surface of the heads.
- Celery.*
724. FORSEE, W. T., JR.
The effect of soil pH upon the growth of celery seedlings on the peat and muck soils of the Everglades.
Proc. Fla. St. hort. Soc. for 1949, pp. 143-6, illus. [received Nov. 1952].
Celery seedlings growing in land with pH values ranging from 6.55 to 7.00 were stunted and chlorotic. In trials with applications of sulphur very marked improvements in growth occurred from dressings of 20 to 40 lb. per bed of 300 × 4½ ft, which lowered the pH to values of 5.20 to 5.73. There were no responses to sodium and calcium sulphates, thus indicating that the response was not to S as a nutrient. There is some evidence that one factor

* See note, p. 3.

contributing to the failure of celery in soils with pH values above 6.00 is Mn deficiency.

725.* KNOTT, J. E.

The problem of "brown checking" of celery.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 12.

A necrosis and cracking of the adaxial surface of the upper part of celery petioles known as brown checking has become a severe problem primarily with the strain of celery Utah 10B which is grown extensively in California. Various aspects of the problem have been investigated by a team of research men in the Division of Truck Crops of the University of California, each bringing to the project a different background of scientific training. Nutrient solution work, anatomical studies, and chemical analyses all point to boron as being involved in the development of the disorder. Varieties of celery differ in their ability to absorb boron when grown in the same soil. It is believed that the heavy rate of fertilization with manure and minerals practised by many celery growers may upset the relationship in the plant between calcium, boron, magnesium and perhaps other nutrients, resulting in the development of the symptoms. At present the most practical solution for the growers is to use one of the strains of green celery not so susceptible to brown checking as is Utah 10B. [Author's summary.]

726. SPURR, A. R.

Fluorescence in ultraviolet light in the study of boron deficiency in celery.

Science, 1952, 116: 421-3, bibl. 18, illus.

There is evidence that the disorders of celery known as brown checking and cracked stem are both symptoms of B deficiency. An examination of the stems under ultraviolet light has shown a blue fluorescence to be characteristic of the early brown-checking lesions and yellow fluorescent spots or flecks to be present in most brown-checking and cracked-stem lesions. Yellow fluorescence was only occasionally displayed in lesions caused mechanically or by other diseases.—Univ. Calif., Davis.

727. WESTGATE, P. J.

Preliminary results and observations on blackheart of celery.

Proc. Fla St. hort. Soc. for 1951, pp. 87-92, bibl. 7.

Significant increases of blackheart of celery, a physiological disorder, were obtained with minor element nutritional sprays, with increases of total fertilizer levels from zero to five tons per acre, and with side dressings of 1,000 lb. per acre of either calcium nitrate or sodium nitrate. Results with mature celery plants put into distilled water indicate that the chemical make up of the celery plant at the time of flooding is a factor in determining whether or not a celery plant will blackheart. [Author's summary.]

728. SEVERIN, H. H. P.

Symptoms of cucumber-mosaic and tobacco-ringspot viruses on celery.

Hilgardia, 1950, 20: 267-77, bibl. 10, illus. [received 1952].

The symptoms on Golden Self-blanching celery (*Apium graveolens* var. *dulce*) are described and compared, illustrations being given of three cucumber-mosaic

viruses, namely celery calico, western cucumber mosaic and common cucumber mosaic, and tobacco-ringspot virus. The last named is not known to infect celery in nature.

729. BANT, J. H., AND STOREY, I. F.

Hot-water treatment of celery seed in Lancashire.

Plant Path., 1952, 1: 81-3.

Hot-water treatment of celery seed (25 min. at 122° F.) for the control of septoria blight has given most promising results in Lancashire, and it has shown the possibility of obtaining clean crops from severely infected seed by this means alone if care is taken to prevent infection from outside sources. The seed should be treated within a year of harvest, for the treatment may reduce germination in old seed.—N.A.A.S., Leeds.

730. SWANK, G., JR.

The control of damping-off organisms in celery seedbeds.

Proc. Fla St. hort. Soc. for 1951, pp. 112-15.

Wettable spergon, arasan SF and tersan applied at the right concentrations as sprays or soil drenches will control damping-off of celery seedlings caused by *Rhizoctonia*, *Pythium* and *Fusarium* spp. without injuring the plants. Methyl bromide is also effective but requires an air-tight seal over the area.

Cucurbits.

(See also 845a, y, 846b, f.)

731. VAN KOOT, Y., AND VAN ANTWERPEN, G.
Belichting en suikerbespuiting van komkommers. (Illumination and sugar-spraying of cucumbers.) [English summary ½ p.]
Meded. Dir. Tuinb., 1952, 15: 427-54, bibl. 18, illus.

If cucumbers are grown in midwinter additional illumination increases overall growth and hastens cropping. A day-length of 16 hours (illumination preceding daylight) is much more effective than continuous lighting, even if this is applied during the first three weeks of the raising period. Illumination during the whole raising period gives a better result than only a 3-weeks illumination at the beginning. Fruit formation will be delayed if illumination is continued after the cucumbers are planted out. A light intensity of about 1,000 Lux is necessary, high tension mercury lamps and fluorescent tubes being suitable. Favourable results are obtained with illumination at a temperature of 20-25° C. Cultural operations must be carefully considered, for mistakes have a worse effect on illuminated than on unilluminated plants. The effect of illumination cannot be replaced by spraying with sugar for this delays fruit formation, but a few applications of a 10% sugar solution to illuminated plants shortly after planting out may sometimes have a favourable effect on earliness and quality, the total crop always being higher. If illumination is applied correctly, the increased profit will be at least ten times the additional expense.

732. HOPKINS, H. T.

Inhibition of growth by benzene hexachloride isomers and protective effect of glucose as measured by cell counting technique.

Plant Physiol., 1952, 27: 526-40, bibl. 44.

* See note, p. 3.

The effect of four purified isomers of benzene hexachloride and 22 additional compounds on the growth of seedling roots [of *Cucurbita pepo* and *Carthamus tinctorius*] was determined by the use of a cell counting technique. The delta isomer is equal to or greater in phytotoxicity than the gamma isomer. The alpha isomer in high concentration inhibits growth and causes formation of a C-tumour in squash roots, but has neither effect on safflower roots. The implication of these data is discussed. The inhibition of growth of squash roots by low concentrations of benzene hexachloride, sodium arsenate, DNP and iodoacetate is causally related to the inhibition of the number of non-vacuolated or meristematic cells between 24 and 48 hours. Irreversible effects of the gamma isomer on root growth after 14 hours contact are indicated by data from transfer experiments. A relationship in point of time was noted between growth inhibition and the phosphate metabolism in squash roots induced by high concentrations of gamma benzene hexachloride. This finding is discussed. Among 22 compounds studied for their protective effects against concentrations of gamma and delta benzene hexachloride inhibiting growth, D-glucose was the most effective. In addition, 2,4-dinitrophenol antagonized the C-tumour reaction induced by gamma benzene hexachloride. [Author's summary.]—U.S.D.A., Plant Industry Station, Beltsville, Md.

733. WELTE, E.

Arbeitstagung über die Bekämpfung der Gurkenwelke. (Working conference on the control of cucumber wilt.)

Reprinted from *Erde u. Ernte*, 1950, No. 3, pp. 2, from abstr. *Rev. appl. Mycol.*, 1952, 31: 314-15.

This disease of cucumbers caused by a *Fusarium* of the *Elegans* group is being investigated at the Institute for Plant Protection, Hohenheim, Stuttgart. Four forms of the disease were observed in 1949: (1) the familiar withering shortly followed or accompanied by a pink or salmon-coloured coating of conidia on the stems, (2) collapse of young plants (rarely old ones) with a soft rot of the stem base and root collar, (3) defective emergence, (4) shortened internodes and stunting. The critical period coincides with the cutting of the first fruits 6-7 weeks after planting out. Soil sterilization is not effective and fungicides must be applied, a copper complex giving good results. Varietal reactions suggest the possibility of using the comparatively resistant *Produkt* in crosses with desirable commercial varieties. *Domina*, *Orion*, and *Reform* are susceptible.

734. WELTE, E.

Versuche zur Bekämpfung der Gurkenwelke durch verschiedene Pfropfverfahren. (Experiments on the control of cucumber wilt by grafting.)

Gemüseb., 1952, 15: 147-52, 155-6.

Earlier work at the Institut für Pflanzenschutz, Hohenheim, Germany, had shown that (1) cucumber wilt is caused by *Fusarium elegans* and *F. martiella*, (2) the infection generally takes place just above ground level, (3) chemical treatment or steam sterilization of the soil do not give satisfactory control, (4) grafting on the wilt resistant *Cucurbita ficifolia* is promising until wilt resistant varieties are available. The present paper studies the question whether wilt control by grafting is

practicable under commercial conditions. The answer is in the positive, with the qualification that it would be desirable to find a resistant cucumber variety for use as a rootstock. In addition to controlling wilt, grafting had the advantage, as illustrated by data, of inducing earlier cropping and thereby assuring higher returns. In practice cleft-grafting was found to be preferable to tongue-grafting. A discussion of the operation includes the recommendation that grafting should be carried out only in dull weather or in the evening. A description of the different symptoms caused by each of the two *Fusarium* species is briefly recapitulated.

735. BALAGANSKAJA, V. E.

The storage of fresh cucumbers. [Russian.]

Sad i Ogorod, 1952, No. 8, pp. 49-50.

A thin vaseline coating applied with muslin or tissue paper was found to preserve fresh cucumbers kept at 10-16° C. for one month or longer without affecting the colour, shape or flavour of the fruit. The process of smearing is quick, one woman handling 20 kg. cucumbers in 15 min., the consumption of vaseline is low, 100 g. per 100 kg. fruit, and the coating can be removed easily by rinsing in hot water.

736. BATRA, S.

Induced tetraploidy in muskmelons.

J. Hered., 1952, 43: 141-8, bibl. 6, illus.

Tetraploid strains of six varieties of muskmelon (*Cucumis melo* L.) induced by colchicine were studied cytologically and compared with the original diploids in determining their usefulness as improved varieties. The quality of the tetraploid fruits was superior to that of the diploids. Generally speaking, the tetraploids were less productive than the corresponding diploid strains. The tetraploid fruits were consistently somewhat smaller and less elongate than the diploids. The tetraploids were less self-fertile than the diploids, but were nearly equal to them in cross fertility. Tetraploid fruits produced fewer seeds than the diploids but sufficient numbers of plump seeds were obtained to permit the $4n$ strains to be propagated readily. [From author's summary.]

737. KEENER, P. D.

Virus diseases and interesting virus-like symptoms in melons in Arizona—1950-1951.

Plant Dis. Repr., 1952, 36: 128-31, bibl. 1, illus.

Unusually widespread mosaic infections occurred in cantaloupes and honey dew melons in the Deer and Salt River Valleys in 1950-51. Observations indicate that proximity of plantings of honey dew melons and of cantaloupes to such aphid-inhabited crops as beets, carrots, alfalfa, etc., has a considerable influence on the amount of mosaic present as well as the rapidity of spread and distribution within the planting. Certain virus-like symptoms (vein banding, yellow mottling and mosaic-like sectoring) have been observed, but the exact status of these disorders is not yet known. Symptoms of curly-top were also noted in cantaloupes, honey dew melons and water melons as in previous seasons.

738. MICHELBACHER, A. E., MIDDLEKAUFF, W. W., AND BACON, O. G.

Mites on melons in northern California.

J. econ. Ent., 1952, 45: 365-70, bibl. 2.

It is suggested that to avoid the build up of mite populations on melons DDT should be applied against cucumber beetles and the melon leafhopper only when the infestations are severe and then at not more than 1 lb. of actual toxicant per acre. When DDT or related insecticidal dusts are applied to honey dew melons they should be used in combination with at least 50% sulphur as this mixture was shown to have a depressing effect upon mites on honey dew melons, though it was found to burn the foliage of other varieties. Two thorough applications of 1% tetraethyl pyrophosphate or 2% parathion dusts at the rate of 20 lb. per acre were found effective against mites attacking melons, the most destructive of them being *Tetranychus pacificus*. Dusts containing 3% aramite or 10% ovotran were also found very satisfactory and can be combined with DDT, if it is necessary to control cucumber beetles or the melon leafhopper along with the mites.

739. MICHELbacher, A. E., AND OTHERS.

Aldrin, dieldrin and heptachlor to control California melon insects.

J. econ. Ent., 1952, 45: 470-5, bibl. 2.

While dieldrin, aldrin and heptachlor were found effective against a number of melon insects, they cannot be recommended, as none of these insecticides has been released for use on melons. The authors do not consider, however, that they should cause serious residue problems.

740. PARRIS, G. K.

Control of mice in watermelon fields.

Circ. Fla agric. Exp. Stat. S-17, 1950, pp. 4, bibl. 2 [received 1952].

The white-footed mouse (*Peromyscus polinotus* group) can be effectively controlled in Florida watermelon fields by alkaloid strychnine or by zinc phosphide bait. 8 oz. of the latter is added to $\frac{1}{2}$ pt. oil and mixed with 40 lb. carrier such as oats or corn. The mixture is applied in small piles at 40 lb./10 acres about a month before planting and again 4 days after planting.

Legumes.

(See also 6, 51, 57, 73, 74, 79, 85, 121s, t, 122j, 660j, 845h, m, 846h.)

741. STAFFORD, H. A.

The distribution and development of enzymes in pea seedlings.

Bull. Torrey bot. Cl., 1952, 79: 351-8, bibl. 14.

The distribution of 5 enzymes was determined in the cotyledons and root-shoot axes of 3-day-old pea seedlings, and the development of enzymatic activity was compared in seedlings 0, 3 and 6 days old. With activity expressed in terms of wet weight, ascorbic oxidase occurred mainly in the root-shoot axis, and cytochrome oxidase, succinoxidase and phosphorylase mainly in the cotyledons, while amylase was equally distributed between the two regions. When compared in terms of dry weight or protein, ascorbic oxidase, cytochrome oxidase and amylase activities were more concentrated in the root-shoot axis, and phosphorylase and succinoxidase in the cotyledons. All the enzymes, except ascorbic oxidase, were found in ungerminated seeds, and all increased in activity upon germination.—*Dep. Bot., Univ. Pa.*

742. MASEFIELD, G. B.

The nodulation of annual legumes in England and Nigeria: preliminary observations.

Emp. J. exp. Agric., 1952, 20: 175-86, bibl. 5.

Comparisons between plants of the dwarf bean, Canadian Wonder, grown in England and Nigeria showed the latter to have lower weights of nodules. Examination of other legumes grown in Nigeria showed these to have a lower range of nodule weights than did the legumes commonly grown in England. The evidence tended to support the hypothesis that high soil moisture is the main factor responsible for heavy nodulation, and it is possible that legumes nodulate less in the tropics simply because the soils are drier. In a spacing trial with peas in England the weight of nodules borne per plant did not vary with spacing. Winter and spring beans in England were found in some cases to be heavily infested with the nodule pest *Sitona lineata*, whose activities may explain some of the vagaries of bean yields.

743. MASABAYASHI, K.

Effect of low temperature on pollen germination and tube growth in broad beans and garden peas. [Japanese, with English summary $\frac{1}{4}$ p.]

J. hort. Ass. Japan, 1952, 21: 37-40, bibl. 7.

The optimum temperatures for pollen tube growth in broad beans and garden peas were found to be 20° and 25° C. respectively. In broad beans germination was unretarded at 10° C. and retarded but otherwise normal at about 0° C. In garden peas germination was retarded at 10° C. and very weak at 0° C. In both species exposure to low temperatures about 0° C. had no injurious effect on subsequent development of pollen tubes.

744. IWAMI, N.

Ecological studies on the common beans.

II. On flower drop. I. [Japanese, with English summary $\frac{1}{4}$ p.]

J. hort. Ass. Japan, 1951, 20: 53-7, bibl. 11.

A negative correlation was established between the temperature at 10 a.m. and the percentage set of flowers in runner and dwarf varieties of kidney bean (*Phaseolus vulgaris*). Three stages of flower abscission were recognized in the runner bean; an early stage, attributed to competition for nutrients between the flowers and developing plant; a middle stage, attributed to competition for nutrients between flowers; and a late stage, associated with the decline of the plant and the effects of high temperatures.

745. TERMAN, G. L., AND MURPHY, H. J.

Yield and quality of peas for processing as affected by lime and fertilizers.

Proc. Soil Sci. Soc. Amer., 1952, 16: 182-5, bibl. 8.

The application of 300-400 lb. finely ground dolomitic limestone in the drills with properly inoculated pea seed sown in soils with pH levels of 5.0 to 5.6 produced normal dark green vines without the addition of N, increased yields and improved quality as estimated with a commercial tenderometer. The application of N or NPK after liming increased vine yields in all cases and yields of low quality peas in most, but the yield of high quality peas was only increased in 4 out of 16 experiments. Both lime and N tended to delay maturity,

It is concluded that the application of N to peas on acid soils can usually only be justified to delay maturity of part or all of the crop so as to regulate harvesting.—*Me agric. Exp. Stat.* [See also *H.A.*, 22: 3830.]

746. BIDDULPH, O., AND WOODBRIDGE, C. G.
The uptake of phosphorus by bean plants with particular reference to the effects of iron.

Plant Physiol., 1952, 27: 431-44, bibl. 15.

Following observations on the effect of pH on the absorption of phosphorus by bean plants (*Phaseolus vulgaris*), the results are recorded of experiments on the effect of phosphorus concentration in the nutrient solution. As this concentration is increased, the tissue concentrations also increase but at a different rate. A concentration of approximately 6 mg. P/g. dry matter in trifoliate leaves is attained from solutions at 0.00005 M P and this value is sufficient for continued growth of leaves. "The corresponding combined stem and petiole concentration is approximately 2 mg. P/g. dry matter when the leaves are adequately supplied. The stems and petioles will, however, build up to 4 mg. P/g. dry matter as more phosphorus is made available. Cordate leaves correspondingly rise from 3 to 7 mg. P/g. dry matter. It is this additional accumulation of phosphorus, beyond the concentration which is adequate for leaf growth and stem extension, which causes disturbances in the metabolic use of other ions, particularly iron. The passage of such ions through tissues rich in phosphorus is interfered with and much of the iron is precipitated along the conductive tissue. The principal effect of high phosphorus concentrations on the development of chlorosis is explainable on this basis. In a nutrient solution containing both phosphorus and iron in nutrient quantities, a precipitate will form which will reduce the amount of available ions of both elements. The effect of the precipitation is twofold. First, it removes some of the materials from solution reducing the effective concentration. Second, the presence of the precipitate upon absorbing surfaces furnishes a barrier to the rapid entrance of either species of ion, i.e., phosphate and iron. Under certain conditions, precipitation reactions may also occur in the conductive tissues of the stem and leaf and so constitute a block in the transfer of certain ions from the conductive tissue to the leaf mesophyll and growing points."—*State Coll. Wash.*, Pullman and Dep. Agric., Summerland, B.C.

747. WADLEIGH, C. H., AND BROWN, J. W.
The chemical status of bean plants afflicted with bicarbonate-induced chlorosis.

Bot. Gaz., 1952, 113: 373-92, bibl. 51.

The response of bean plants [*Phaseolus vulgaris*] to additions of 8, 16 and 32 m.e./l. NaHCO_3 to a base nutrient solution was compared with that of plants grown on base nutrient solution adjusted to pH 8.0 with NaOH. Higher concentrations of sodium bicarbonate were associated with greater intensities of chlorosis and marked inhibition in growth. The treatments primarily effected a lowered iron "activity" and calcium content of the leaves and an enhanced potassium content. The accumulation of citric acid in leaves showing intensified chlorosis was found to be a direct concomitant of potassium content. It is suggested that the primary effect of the bicarbonate ion was through its effect on protoplasmic consistency of the absorbing cells of the roots so that these bean plants showed an accentuated

accumulation of monovalent cations and a depressed accumulation of divalent cations. The relation of bicarbonate-induced chlorosis to lime-induced chlorosis in the field is discussed. [Authors' summary.]

748. AFANASIEV, M. M. MORRIS, H. E., AND METCALF, H. N.

Control of bacterial halo-blight disease of garden beans in Montana.

Plant Dis. Rept., 1952, 36: 135-6.

Conditions for growing high-quality garden beans in Montana are generally very good, but bacterial blight (*Pseudomonas phaseolicola*) frequently ruins excellent crops. Trials for the control of the disease were carried out with 3 materials applied eight times during the season. Bordeaux mixture produced complete control, sulphur had only a slight beneficial effect and ferimate gave no control.

749. ANGELL, H. R.

Seedling blight. V. A new soil moisture relationship to the disease in peas.

J. Aust. Inst. agric. Sci., 1952, 18: 99-101, bibl. 4.

If peas are sown in air-dried, local experiment station, soil which is watered only once, either before or immediately after sowing, emergence is about 60 per cent. However, if the same quantity of water in the soil at sowing time is given in two applications, one of them a week or more before sowing, and the other immediately after sowing, emergence is much less, being sometimes as low as 26 per cent. If the second lot of water is applied at sowing, and the soil is stirred to distribute the moisture evenly throughout the mass, emergence is substantially improved, but is less than if the water is given in one application at sowing. The given variations in percentage emergence are due to the influence of different watering methods on seedling blight caused by *Pythium* spp. [Author's summary.]

750. KERLING, L. C. P.

Het overgaan met zaad van de Amerikaanse vaatziekte van erwten. (Seed transmission of fusarium wilt of peas.) [English summary ½ p.]

Tijdschr. PLZiekt., 1952, 58: 236-9, bibl. 4.

Infection of pea fields with wilt, caused by *Fusarium oxysporum* f. *pisi* (Linf.) race 1 Sn. et H., is increasing in Holland. Tests were carried out at the Phytopathological Laboratory, Wageningen, to determine whether and to what extent this increase was due to the use of seed harvested from infected plants (suspected seed). The results indicate that the disease is present in or on the seed coat and accumulates in the soil. After it has been introduced into healthy soil it takes 2 or 3 pea crops before its presence becomes evident. It was estimated that about 2% of suspected seed carried the fungus.

751. GREGORY, K. F., AND OTHERS.

Antibiotics as agents for the control of certain damping-off fungi.

Amer. J. Bot., 1952, 39: 405-15, bibl. 28.

The properties of 7 antibiotics and a large number of antibiotic-producing cultures were studied with reference to their effectiveness as agents for the control of damping-off, caused by *Pythium* spp., and their compatibility with the root nodule bacteria (*Rhizobium* spp.)

used for inoculation of legumes. Actidione and fradacin were active against *Pythium* spp. but inactive against *Rhizobium* spp.—Univ. Wisconsin.

752. CHANG, S. C.

The speed of toxic action on the pea aphid of several insecticides.

J. econ. Ent., 1952, 45: 370-2, bibl. 7.

Of the 19 insecticidal dusts tested in laboratory trials at Oregon State College against the pea aphid, *Macrosiphum pisi*, those which induced hyperexcitability in aphids, were also in most cases the fastest in their killing action.

753. SRIVASTAVA, A. S., AND HULL, W. B.

Effect of wind direction on the pea aphid control during dust application.

Sci. & Cult., 1952, 18: 191-2.

In 2 trials, in which 35 lb. DDT dust was applied per acre with a tractor-drawn duster operating across the direction of a 12 m.p.h. wind, pea aphid control was somewhat better when the dust was applied with the wind than when it was applied against the wind.—Univ. Wisconsin, Madison.

754. ILIĆ, B.

Trials on the control of *Bruchus pisorum* with BHC. [Serbian, French summary ½p.] *Zasht. Bilja*, Belgrade, 1951, No. 5, pp. 32-8.

Complete control of pea weevil, *Bruchus pisorum*, was obtained with a BHC dust (Agrocide). In laboratory trials this product killed the adults much more rapidly by contact than by its fumigant action.

755. HOWE, W. L., SCHROEDER, W. T., AND SWENSON, K. G.

Seed treatment for control of seed-corn maggot and seed decay organisms.

Bull. N.Y. St. agric. Exp. Stat. 752, 1952, pp. 34, bibl. 8, illus.

The conditions in which the seedcorn maggot, *Hylemyia cilicrura*, causes serious damage to germinating lima bean seed in New York State are also favourable for seed decay organisms. Reliable control was obtained by mixing the following combined insecticide-fungicide with the seed at the stated amounts per bushel: 1.3 oz. Arasan SF plus 1 oz. each of lindane (25% wettable powder), dieldrin (25% w.p.), aldrin (25% w.p.), and chlordane (50% w.p.) plus ½ pt. 4% methocel sticker. Good stands were obtained from treated seed sown in mid-May, though it is not safe to sow untreated seed before early or mid-June in this area. Treated seed was stored at 40-50° F. for 58 weeks without injury to the seed or reduction in the efficiency of the treatment.

756. STAHL, A. L., AND MUSTARD, M. J.

Consumer packaging on Florida beans.

Proc. Fla. St. hort. Soc. for 1949, pp. 151-8, illus. [received Nov. 1952].

Studies are described in which green [kidney] beans of several varieties were packed in cellophane and other wraps and placed in cartons, after trimming and dipping in hypochlorite and citric acid dips of different concentrations to prevent discoloration and decay, and were stored at different temperatures or shipped to distant markets. The results show that beans can be successfully marketed in this way.

Mushrooms.

757. STOLLER, B. B.

Studies on the function of the casing for mushroom beds. Part I. The relation of the abnormal growth of the cultivated mushroom to fructification and casing soil. Part II. Some chemical and physical characteristics of the casing soil and their effect on fructification.

Bull. Mushroom Grs. Ass., 1952, Nos. 34 and 35, pp. 289-97, 321-6, bibl. 18.

Abnormal growth is assumed to be related to the occurrence of a volatile substance, similar in action to a plant hormone, which diffuses from the mycelium and produces different effects at different concentrations. When present in large amounts it stimulates mycelial growth and protects it from attack by other moulds. If it is destroyed in the casing material or present in very low concentration, fructification is initiated. If allowed to accumulate in the casing it causes abnormal growth; its oxidizing intensity is apparently so great as to prevent thickening at ends of the strands of hyphae from which the mushrooms develop. Thus one of the functions of casing soil is to provide an alkaline-oxygenated medium for the destruction of the volatile substance. The requirements for normal mushroom production (after providing for proper moisture and pH of soil and suitable compost) are: removal of the carbon dioxide which actively evolves from the casing soil and compost; a supply of oxygen; and filtration of atmospheric gases through the loam (instead of which provision is usually made for forced air-movement or ventilation). Chemical and physical characteristics discussed are moisture capacity of soil and peat, effect of lowering temperature on fruiting, effect of K in casing soil, the colloidal nature of casing materials and cation exchange, pH, "calcium soils", "hydrogen soils" and crumb structure.

758. RESSORT, L.

Essais sur le "champignon de couche".

(Research in mushroom growing.)

Rev. hort. Algér., 1952, 56: 109-13.

In an experiment in Algeria made on beds in which production was declining, alteration of the microclimate of the casing soil by covering it with chaff or shavings raised the yield from 40 to 120 kg. mushrooms per ton of compost. Research is now being directed towards finding the ideal casing.

759. MIDDLEBROOK, S.

Short composting. Better yields with less labour.

Bull. Mushroom Grs. Ass., 1952, No. 31, pp. 195-9.

A description with diagrams is given of the Sinden method of short (entirely aerobic) composting. The manure, which must be thoroughly saturated, is stacked in long triangular stacks with a 4 ft. base and 3 ft. 6 in. high. Virtually the whole of the stack is aerobic all the time (compared with about 60% anaerobic or otherwise unsuitable for half the time in the traditional square stack). Advantages are higher yield (1.5-2.25 lb./sq. ft. compared with 1.25-1.75 with the normal method), saving of time (duration 9-13 days), saving of labour (2-3 turns), less peak-heating (24 hours). Disadvantages

are 2-3 times more space required and strict adherence to timing necessary.

760. MYCOHM.

Peak-heating by electric cable.

Bull. Mushroom Grs. Ass., 1952, No. 33, pp. 261-4.

A symmetrical arrangement of nickel chrome wires 4-6 in. apart is laid below the compost and low-voltage current is passed through it. Practical details and problems are discussed.

761. CANHAM, A. E.

Electrical space heating.

WARD, C. V.

Atmospheric control.

ALLNUTT, F.

Radiant heat.

BATTEN, E. J.

Air conditioning.

FAWCETT, C. H.

Low pressure steam heating.

KINNELL, J. L.

Hot water heating.

Bull. Mushroom Grs. Ass., 1952, No. 32, pp. 231-2, 232-3, 234, 235-9, 239-41, 241-3.

Electrical space heating. The low-voltage conduit system is a satisfactory method of heating mushroom houses. It consists of long lengths of heavy gauge screwed steel conduit $\frac{3}{4}$ in. in diameter, through which current is passed at a low voltage (under 30), and can be mounted uniformly over a mushroom house. Temperatures can be controlled within $\pm 1^\circ$ F. Running costs in 1950 for one such installation in a 3,000 cu. ft. house containing 450 sq. ft. of bed averaged 2s. 6d. per 24 hours. *Atmospheric control.* By employing a portable air-conditioning unit which extracts the air, passes it through a spray of deep well or mains water and returns it cooled by gentle diffusion, temperatures in mushroom houses can be maintained at 60° F. when outside temperatures are about 80° . *Radiant heating,* in which the pipes are embedded in the concrete floor, has 3 advantages which make it particularly suitable for the tray system of mushroom growing: (1) even distribution of pipes throughout the floor; (2) uniform ventilation down to floor level; and (3) absence of pipes above floor level to take up space. Methods are described. *Air conditioning.* The application of this system to the control of temperature and humidity in mushroom houses is discussed. A layout for a 5,000 cu. ft. house is illustrated. *Low pressure steam heating.* A central boiler-house and small diameter heating lines are employed. Thermostatic control can be applied and humidity can be regulated by means of steam bleeders on the heating lines. Direct steam injection can be employed to sterilize casing soil, to aid house sterilization before a new crop, and to obtain peak heat. Peak heat can also be obtained by the temporary introduction of gilled pipe with flexible end connexions or, in the case of a permanent pasteurizing house, by the use of a large amount of fixed heating pipe. *Low pressure hot water heating.* The advantages of this method, which is the most popular means of heating for all types of buildings in this country, are: (1) reliability and simplicity, (2) the temperature of the heating surface can be varied over a wide range and the installation is capable of great overloads to compensate for sudden very

low outside temperatures, (3) the system can be constructed throughout of cast iron, the least corrodible of all commonly used metals. Its disadvantages are (1) the pipe-heating surface is large compared with that used with steam, (2) control is not rapid, (3) steam is not available for sterilization and humidification. Automatic control of air temperature can be obtained. The inclusion of a hot water circulator is recommended.

762. FAWCETT, C. H.

The merits of forced draught equipment.

Bull. Mushroom Grs. Ass., 1952, No. 34, pp. 300-1.

The use of forced draught equipment makes possible the burning of very small fuels such as coke breeze, coal slack and anthracite smalls, and the use of thermostatic control. The base or ashpit of the boiler is sealed up and air is blown into it by a low pressure fan fitted with a damper to control rate of air supply and hence of burning. Deep firebars not more than $\frac{1}{4}$ in. apart are used. Control of the fan is obtained either from an air thermostat in the house or an immersion thermostat in the water system. A simple and inexpensive time switch is used as a rekindling control to make the fan run for a few minutes every hour in mild weather when the fire would not be called for by the thermostat and would otherwise die.

763. REEVE, E.

Influence of vitamin supplements on mushroom yields.

Proc. Amer. Soc. hort. Sci., 1952, 59: 367-71, bibl. 10.

Calcium pantothenate, thiamine hydrochloride, pyridoxine hydrochloride, riboflavin, and niacin when applied singly and in combination to commercial mushroom compost and at various stages in development of the crop failed to influence total yield, production pattern, or size of mushrooms, within the scope of these experiments. [Author's summary.]

764. STOLLER, B. B.

Abnormal growth and fructification of the cultivated mushroom.

Science, 1952, 116: 320-2, bibl. 5, illus.

It has been claimed that abnormal elongation of mushroom stems with retarded growth of caps is due to the injurious effects of CO_2 released during respiration of sporophores. In the trial reported here, however, the abnormality occurred when bell jars with different openings were placed over mushrooms, whether or not any CO_2 accumulated. It is suggested that another and heavier volatile substance with oxidizing properties affected the growth. There is some indication that this volatile substance may be a defensive mechanism for mycelial growth and that it may inhibit fructification unless modified in the casing soil. One function of the casing soil may be to provide an alkaline-oxygenated medium for the destruction of this volatile substance. A fuller account of this work is to be published elsewhere.

765. WOOD, F. C.

Stroma: its causes and its cures. Stroma under the soil.

Grower, 1952, 38: 453-5, 505-7, illus.

Stroma, a disorder of mushrooms, resulting in retarded growth and the production on the surface of thick and

matted spawn threads, is commonly associated with an inverted water table in the casing soil. Such conditions may result from light and infrequent waterings; lack of sufficient air movement which reduces surface evaporation, or casing with completely dry or excessively wet soil. Breaking up the surface by watering with a pressure hose or by raking is the usual treatment. In 1952 a deeper seated form of stroma was common, in which heavy thread formation occurred in casing soil immediately above the compost, due, it is suggested, to a deterioration in soil crumb structure following wet summers and mild winters. To treat this form of stroma a layer $\frac{1}{2}$ in. deep of furnace ash plus 2 oz. superphosphate per sq. yd. of bed area should be spread on the surface and raked in thoroughly, matted threads brought to the surface being removed. Production should re-start in 10-14 days.

766. BELS-KONING, H. C., AND DE JONG-OLTHOF, K.

Bruine vlekken op champignons ten gevolge van aantasting door *Pseudomonas tolaasi* Paine. (A brown blotch disease of cultivated mushrooms caused by *Pseudomonas tolaasi* Paine.) [English summary 10 lines.] *Tijdschr. PLZiekt.*, 1952, 58: 243-6, bibl. 7, illus.

A brown blotch disease of mushrooms, caused by *Pseudomonas tolaasi*, was studied under laboratory and natural conditions. Old mycelium in the casing soil and stumps of mushrooms left on the beds provide sources of infection, and the bacteria are probably spread by water sprayed on the beds. Trashing is of value in preventing the spread of the disease. No direct chemical control method was found.—Lab. Champignonteelt-onderzoek, Houthem.

767. HEY, G. L.

Recent developments in disease control.

Bull. Mushroom Grs Ass., 1952, No. 27, p. 79.

Notes are given on the use of fungicides based on zinc ethylene bis dithiocarbamate, against bubble, dactylum, verticillium and red geotrichum, especially the first.

Onions and related crops.

(See also 50, 122i, 778, 845i, o, r, 846a.)

- 768.* JONES, H. A.

Hybrid onions and the production of hybrid seed.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 8, bibl. 2.

Methods that make practical the commercial production of hybrid onion seed have been developed in the United States. By following certain procedures it is possible to obtain large populations of onion plants that are all male-sterile. When these male-steriles are interplanted with fertile inbreds they produce heavy yields of hybrid seed. For the production of F_1 hybrid seed it is necessary to develop three inbred lines: (1) A male-sterile line; (2) a companion, or maintenance, line, which is necessary for the perpetuation of the male-sterile line, and (3) an unrelated inbred to cross with the male-sterile line for the production of hybrid seed. Hybrids that outyield the parent commercial varieties, Brigham Yellow Globe and Early Yellow Globe, are

* See note, p. 3.

more attractive, and are more uniform in colour, shape, size, and time of maturity, have been developed for the northern region of the United States. They keep better in storage and have more retentive scales that withstand rough handling. Early hybrids that outyield the parent varieties, Excel, L 690, CC 163, and Texas Early Grano 951, have been developed for the southern United States. This has been done by developing lines with good combining ability, by incorporating resistance to pink root, and by eliminating the tendency to split and bolt. The production of hybrid onion seed is on a sound basis, and it is predicted that F_1 hybrids gradually will replace the standard varieties. [Author's summary.] [For a short note on the same subject see *Gdnrs' Chron.*, 1952, 132: 94.]

769. BUGROVA, V. P., AND OTHERS.

A wider application of the warm method of storage for onion mother plants. [Russian.]

Sad i Ogorod, 1952, No. 8, pp. 44-7.

Onion seed plants kept at $3-10^\circ\text{C}$. over the whole storage period gave considerably higher yields of seed than those stored by the conventional method of $3-10^\circ\text{C}$. in the autumn reduced to -1 to -3°C . in the winter, or those stored at -1 to -3°C . throughout. The warm method of storage is recommended for all pungent varieties grown in the central and northern parts of the U.S.S.R., but for the storage of mother plants of less pungent varieties the old method of low winter temperature storage is still recommended.

770. WÄDENSWIL.

Einfluss der Steckzwiebelgrösse auf den Ertrag und die Qualität der Speisewiebeln. (The effect of size of onion sets on yield and quality of onions.)

Landw. Jb. Schweiz, 1952, 66: 686-7.

All factors considered, onion sets of medium size were found to give the economically most desirable results.

771. EICHLER, W.

Giess- und Spritzverfahren als therapeutische Massnahmen zur Zwiebelnfliegenbekämpfung durch Kontaktinsektizide. (Watering and spraying with contact insecticides as protective measures against the onion fly.)

NachrBl. dtsh. PflSchDienst, Berlin, 1952, 6: 167-71, bibl. 9.

Attacks of the onion fly, *Hylemyia antiqua*, can be checked by watering or spraying with modern insecticides containing DDT, BHC or parathion. They are not recommended for use in the field, however, Gesarol applied with the seed being more economical. In the experiments described the DDT and BHC preparations Certoxan and Spritz-Verindal-Hx were particularly effective.

772. MANN, L. K.

Anatomy of the garlic bulb and factors affecting bulb development.

Hilgardia, 1952, 21: 195-251, bibl. 45, illus.

The detailed anatomical investigation, described here with the aid of clear microphotographs, on the structure of garlic, *Allium sativum*, was undertaken to establish a background for cultural studies on garlic as a crop plant. The investigation covered the gross structure of the plant, bulb development in field-grown garlic, factors

determining bulbing and seed-stalk formation, and the anatomical structure of the stem, foliage leaf, protective leaf, storage leaf and root. The literature is reviewed with special reference to the anatomy of other *Allium* spp. The studies on factors influencing bulb development have been summarized elsewhere [see *H.A.*, 22: 3858]. An attempt to induce seed-stalk formation (bolting) by subjecting cloves of both late and early varieties to low temperatures for 2 or more weeks starting in January was unsuccessful.

Rhubarb.

773. TASKER, J.

The West Riding rhubarb industry.

Agriculture, Lond., 1952, 59: 386-91.

An account is given of methods used by growers in the West Riding of Yorkshire who specialize in forcing large quantities of rhubarb. Field cultivation, forcing in sheds, harvesting and marketing are described.

Root crops.

774. BANGA, O.

Krotenstudies. VI. De invloed van het loof op de groeisnelheid van de knol. VII. Classificatie van platte en ronde krotten naar knolindex, niveau van loofprestatie en groeisnelheid. (Studies of red garden beets. VI. The influence of the foliage on the growth rate of the root. VII. Classification of varieties according to root-index, level of foliage-capacity and growth rate.) [English summaries 1½ and 1 pp.]

Meded. Inst. Vered. Tuinbouwgew. 19, 1950, pp. 79, bibls. 4 and 5, illus. [omitted in error from *H.A.*, Vol. 21].

There are different levels of root forming capacity of the foliage (foliage capacity). On a given level of foliage capacity the rate of growth of the root is, within certain limits, proportional to the weight of the foliage. The influence of different combinations of foliage capacity and foliage weight was studied in experiments where plants were harvested periodically every two weeks during the growing season. A plant with small foliage and a high level of foliage capacity very quickly develops a root, which ripens early. A plant with heavy foliage starts its root development phase later and ripening is also later. If the day length is not too short, an increase in temperature may counterbalance the decrease of day length, but if the day length is less than 10 hours the foliage weight cannot usually be maintained by increased temperature. The different root forms are described and classified by means of the l/d index (l=length of root, d=its diameter). The rate of root growth of different strains has been computed by comparing them with standard strains.

775. BANGA, O., AND KEULS, M.

Praktijkproeven wortelen Amsterdamse Bak 1949-1950. I. Verslag van de proefresultaten bij Amsterdamse Bak. II. Toelichting op de wiskundige verwerking. (Trials with the carrot variety Amsterdam Bak 1949-1950. I. Report on the trials. II. Statistical results.)

Meded. Inst. Vered. Tuinbouwgew. 37, 1952, pp. 1-28 and 29-33, bibl. 2, illus.

This is an examination of the characters of over 20 selections of the variety Amsterdam Bak, tabulated with reference to rapidity of growth, leaf weight per 10 g. of root, and shape of roots.

776. BANGA, O., AND KEULS, M.

Praktijkproeven zomerwortelen 1949-1950. I. Verslag van de proefresultaten bij zomerwortelen. II. Toelichting op de wiskundige bewerkingen. (Trials with summer carrots 1949-1950. I. Report on the trials. II. Statistical results.)

Meded. Inst. Vered. Tuinbouwgew. 38, 1952, pp. 1-15 and 16-20, bibl. 2, illus.

This is an examination of the characters of some 20 carrot selections, including some of the varieties, Slanke Nantes and Vertou, with particular reference to shape and colour of roots.

777. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.

Forsøg med stammer af gulerødder til foderbrug. 1949-1950. (Trials with carrot varieties for feeding purposes 1949-1950.)

Tidsskr. Planteavl, 1952, 55: 439-42, being *Medd. Stat. Forsøgsvirks. Plante kult.* 464.

Tabulated data on dry matter yield of top and root and on some properties of 14 Danish strains of 4 carrot varieties.

778.* HAWTHORN, L. R.

The influence of spacing, moisture supply, and other factors on speed production of carrot, onion, and lettuce.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 11.

Various fundamental, cultural studies were conducted during the period 1945 to 1950 with carrot, onion, and lettuce seed crops to discover more efficient and profitable methods of production. Information was obtained on the effects of time of sowing and rate of seeding on size of Red Core Chantenay carrot seedlings and on the effect of seedling size on seed yield. From factorially designed experiments with both carrot and Yellow Sweet Spanish onion seed crops, similar data were obtained on the effect of soil moisture and spacing. Bouyoucos blocks and an electrical bridge, together with some tensiometers, were used to obtain detailed records of soil moisture tension from a depth as shallow as 3 inches under onions to 60 inches under carrots. Low soil moisture in carrots and high soil moisture in onions favoured high seed yields. Spacing much closer than is normally practised favoured high seed yields in both onions and carrots. With lettuce, time of planting was found to be an important factor in overwintered crops. Other tests indicated that from low seed yield but good market strains of Great Lakes lettuce it is possible to select for higher seed-yielding types. [Author's summary.]

779. KELLY, W. C., SOMERS, G. F., AND ELLIS, G. H.

The effect of boron on the growth and carotene content of carrots.

Proc. Amer. Soc. hort. Sci., 1952, 59: 352-60, bibl. 15, illus.

Red Cored Chantenay carrots were grown in sand culture both in a greenhouse and in the open with

* See note, p. 3.

Hoagland's solution containing B concentrations of 0.0, 0.1, 0.5, 2.0 and 5.0 p.p.m. B deficiency symptoms developed with no B and toxicity symptoms with 5.0 p.p.m. With mature carrots 0.5 p.p.m. B produced the greatest yield of tops and 2.0 p.p.m. the greatest yield of roots. On a fresh weight basis the carotene content increased with each increment of B, but on a dry weight basis it did not change once B deficiency symptoms had been alleviated. There was no consistent relation between the carotene content and the B content of the roots, and the increase in carotene associated with maturity was not accompanied by similar increases in B. The low carotene content of B deficient roots may be due to disruption of carbohydrate supplies to the roots rather than to a direct effect of B on carotene synthesis.—U.S. Dep. Agric., Ithaca, N.Y.

780. OSNICKAJA, E. A., AND OSIPOVA, N. I.

Carrot phomosis. [Russian.]

Sad i Ogorod, 1952, No. 9, pp. 60-2, illus.

An account is given of the few outbreaks of carrot phomosis caused by *Phoma rostrupii* in Russia. Carrots grown on light sandy soils appear to suffer more from the disease than those grown on heavier, more fertile, soils. The fungus attacks both roots and aerial parts and is transmissible by seed. Seed dusted with "granozan" (4 g. per 1 kg. seed), 2% NIUIF-1 (7 g. per kg.) and 50% tetramethylthiuram-disulphide (10 g. per kg.), or soaked in NIUIF-1 solution (1:300 for 10 min. or 1:400 for 15 min.) was freed of the disease, but all treatments temporarily inhibited the growth of seedlings. Crop rotation and growing seed plants in isolation are recommended to prevent spread.

781. PAUCK, P., AND KOCH, F. W.

Über Versuche zur Bekämpfung der Möhrenfliege. (Control of the carrot fly.)

NachrBl. dtsh. PflSchDienst., Braunschweig, 1952, 4: 113-16, bibl. 5.

Notes are given on the biology of the carrot fly [*Psila rosae*], with particular regard to the flight period, and results of control experiments are tabulated. Soil treatments with gamma-hexa-preparations, and surface applications before sowing were effective, and good results were obtained by applications in the drills at the time of sowing, and between the rows during growth.

782. GROFF, G. W.

The introduction into the United States and the culture of *Eleocharis dulcis*, the "Matai" of China.

Proc. Fla St. hort. Soc. for 1950, pp. 262-5, illus. [received Nov. 1952].

A brief account is given of the botany of *Eleocharis dulcis*, the Chinese water chestnut or matai, its introduction to the U.S.A., and its cultivation. It appears to be particularly well adapted to many of the low lying areas in southern Florida.

783. HEROLD, F.

Untersuchungen zur Rettichschwärze und zur Biologie ihres Erregers *Aphanomyces raphani* Kendr. im Vergleich mit weiteren *Aphanomyces*-Arten. (Investigations on radish black rot and the biology of the causal organism *Aphanomyces raphani* Kendr. in comparison with other *Aphanomyces* species.) *Phytopath. Z.*, 1952, 19: 79-125, bibl. 58, illus.

The radish black rot, caused by *Aphanomyces raphani*, results in great losses every year in south Germany. A detailed description is given of the fungus and of its effect on radishes. High water content of the soil favours infection, a low one restrains it. High mineral fertilizing reduces infection and this is attributed to high salt concentrations. With the exception of the earliest seedling stages radishes may be attacked at all ages.

784. SEVERIN, H. H. P., AND TOMPKINS, C. M.

Transmission of radish-mosaic virus by aphids.

Hilgardia, 1950, 20: 191-205, bibl. 7, illus.

[received 1952].

Twelve aphid species, four of which multiply on radish under natural conditions, were found to be vectors of radish-mosaic virus. Symptoms of the disease are described and illustrated. The virus proved to be non-persistent in the aphid vectors, infections occurring only within 3 hours of transfer from diseased to healthy plants. Mechanical inoculation resulted in a slightly higher percentage of infection than transmission by aphids.

785. JACKS, H., AND LAMB, K. P.

Glasshouse tests of organic insecticides against aphids on swedes.

N.Z. J. Sci. Tech., Sect. A, 1952, 34: 172-8, bibl. 3.

Nicotine sulphate and 13 organic insecticides tested against *Brevicoryne brassicae* and *Myzus persicae*.

786. INOUE, Y., AND SHIBUYA, M.

Flower-bud formation in spring turnips.

[Japanese, with English summary $\frac{1}{4}$ p.]

J. hort. Ass. Japan, 1951, 20: 105-9, bibl. 8.

From 3 seasons' data it is concluded that flower-bud formation usually occurs 50-60 days after sowing turnips in the spring compared with 60-80 days for autumn sown plants. There was considerable variation among different varieties which can be classified into 4 groups according to the length of the period. Flower-bud formation was found to be hastened by low temperatures, and if sowing was delayed until May, bolting virtually ceased. There seemed to be no direct relationship between the period of flower-bud formation and the occurrence of pithiness in the root.

787. BRYDEN, R. J.

Growing better turnips.

Bett. Crops, 1952, 36(7): 14-16, 40-1.

Studies by the Soil Department of the Ontario Agricultural College, Guelph, over a period of years have in general shown a good correlation between turnip yields and fertilizer applications based on soil tests. Yield responses obtained from P and K applied in 6 tests indicate the essential nature for turnips of both these elements. The practice adopted by some growers of applying salt was found to be valueless and in some cases harmful. Foliage applications of borax have been more effective than soil applications via fertilizer mixtures in preventing water-core (brown heart). Turnips exported to the U.S.A. are trimmed, washed and waxed.

Salad crops.

(See also 778, 845f, n.)

788. CANHAM, A. E.

Electrical soil warming for salad crops in frames.

Tech. Rep. Brit. elect. Res. Ass. W/T24, 1952, pp. 9, bibl. 3, illus., 9s.

It had previously been recommended [see *H.A.*, 13: 143] that for heating salad hotbeds the electrical dosage should be 40-45 watt-hours/ft²/day in the south of England and 50-55 in the north, and that the lettuces should be planted as near January 10 as convenient. The object of the investigations described in this report was to determine whether better results could be obtained by using different dosages or by varying the date of planting. It was found that pre-Christmas planting produces lettuces a fortnight earlier than mid-January planting at a cost of 15-30 KWh per Dutch light. The number of lettuces is not affected by the magnitude of the dosage employed. Increasing the dosage had a little effect on earliness but for commercial purposes the dosages originally recommended should be used unless a sufficiently favourable market justifies the increased running cost, when 70-80 watt-hours/ft²/day can be used. An intercrop of carrots did not retard the development of the lettuces. There are 2 appendixes: Notes on the cultural recommendations for hotbeds and The effect of soil warming on soil temperatures in frames. In the latter it is shown that the temperature rise is not proportional to dosage, and that doubling the dosage of 35 watt-hours/ft²/day raises the soil temperature only a further 2-2½ F.

789. JACKSON, A. A.

The influence of the covering soil on the production of witloof chicory.

J. roy. hort. Soc., 1952, 77: 380-2, bibl. 1, illus.

For the economical cultivation of chicory in England the local soil must be of the light, well-drained type. This is the most suitable and the only economical covering material. Brick earth can be applied only when the earth is very fine and it can be protected from winter rains. Sand produces a crop which is apparently clean but deteriorates rapidly. Light brown granulated peat produces large, good quality but somewhat loose chicories.—Wye College.

790. EVENARI, M., AND NEUMANN, G.

The germination of lettuce seed. II. The influence of fruit coat, seed coat and endosperm upon germination.

Bull. Res. Coun. Israel, 1952, 2(1): 75-8, bibl. 5, illus.

When the fruit and seed coats were removed and the endosperm carefully opened in lettuce seeds of the variety Grand Rapids, 93.6% germination occurred at 26° C. in darkness, compared with 14.9% in untreated seeds. Removal of the fruit coat also raised germination to over 50%, but it is believed that this was due to the involuntary opening of the endosperm in some cases. Opening the endosperm broke thermodynamicity at 30-31° C. to about 50%, and also reduced the sensitivity of the seeds to the germination inhibitor coumarin as compared with intact seeds.—Dep. Bot., Hebrew Univ., Jerusalem.

791. MARVEL, M. E., AND HAVIS, J. R.

The influence of depth of transplanting on size and shape of head lettuce.

Proc. Amer. Soc. hort. Sci., 1952, 59: 372-6, bibl. 4, illus.

Imperial 44 lettuce plants were transplanted in the field at the shallow, medium and deep depths. The heads from the three transplanting depths were the same in

height but were significantly different in width. Heads from the deep transplanted plants had the narrowest width and were definitely more conical than the shallow or medium transplanted. The weight of all heads was the same. As only the width varied it is evident that the narrowest heads, from deep transplanted plants, appeared to be the result of soil pressure around the plant. [Authors' summary.]—*Va agric. Exp. Stat.*

792. ØDELIEN, M., AND SORTEBERG, A.

Molybdenmangel hos salat i karforsøk. (Molybdenum deficiency in lettuce grown in containers.) [English summary 16 lines.] *Forsk. Landbruk.*, 1952, 3: 69-74, bibl. 16, illus.

Lettuce plants grown in sphagnum peat (pH about 5.5) showed severe symptoms of disease and many died. In a repetition of the experiment it was found that molybdenum deficiency was the cause of the trouble, as healthy growth was made in a medium which either received a small application of (NH₄)₂MoO₄ or was limed to give a pH of approximately 7.5. No effect was obtained from any of the other minor elements applied at the lower pH values. The total Mo content of the peat was determined as 0.32 p.p.m. in the dry matter. The symptoms displayed by Mo-deficient plants, from the first leaf onward, were chlorotic leaves with reduced turgor and curled tips which later wilted and dried up, a necrotic strip appearing along the mid-rib. Many of the plants died at an early stage, while the development of those that recovered was severely checked.—Agricultural College of Norway.

793. DIAS, H. F.

Uma virose da alface. Sua transmissão pelos afídeos. (Aphid transmission of a lettuce mosaic.) [English summary 1 p.] *Agron. lusit.*, 1951, 13: 153-70, bibl. 31, illus. [received 1952].

Lettuce production round Lisbon is limited to the cultivation of varieties resistant to a mosaic disease which appears to be related to, or identical with, lettuce mosaic. Transmission experiments showed that the virus could be transmitted by *Macrosiphum pelargonii*, *M. sonchi* and *Myzus persicae*, the first being the most efficient vector. It was not transmitted by *Myzus pseudosolani*. Studies on the mechanism of infection by *M. pelargonii* showed that a feeding period of 3-5 minutes on the infected host was sufficient for the aphid to become infective, and that power of infection was retained for 8 hrs., thus showing the virus to be of the non-persistent type. The mosaic symptoms produced on several species of *Lactuca* and cultivated varieties of lettuce are described. The virus was successfully transmitted by *M. persicae* to 2 Compositae (*Carduus broteroi* and *Urospermum picroides*) and 2 Leguminosae (*Pisum sativum* and *Lathyrus sativus*). *Nicotiana tabacum* was not susceptible.

794. TUNBLAD, B.

Ett lyckat bekämpningsförsök mot knäppare. (A successful experiment to control cutworms.)

Växtskyddsnotiser, 1952, No. 2, p. 29.

After a preliminary trial it was found possible to save a glasshouse lettuce crop from destruction by cutworms by watering it with a 0.2% solution of a 6% lindane

emulsion at the rate of 5 l./m². Neither the lettuce nor radishes sown for test purposes had any off-flavour.

795. HOWARD, H. W.

Autotetraploid green watercress.

J. hort. Sci., 1952, 27: 273-7, bibl. 9, illus.

An autotetraploid green watercress, known as A-4, was obtained by colchicine treatment of a commercial green variety. It has larger, broader and thicker leaflets than the diploid stock and is more succulent to eat. It also appears to be less prone to flowering, which might allow it to be cropped later in the year than normally. In a single determination its ascorbic acid content was higher than that of the diploid. It is not yet known, however, how it will compare in yield with the diploid, nor whether it is resistant to crook root. Its lower seed fertility may be a disadvantage. Other possibilities in breeding tetraploid watercress are discussed.—Plant Breeding Institute, Cambridge.

Spinach.

796. DOESBURG, J. J.

De invloed van oxaalzuur op de opnemings- en uitscheiding van calcium door mens en dier. Een onderzoek naar de chemische kwaliteit van een aantal spinazieselecties. (The influence of oxalic acid on the intake and release of calcium by plants and animals. A study on the chemical quality of some spinach selections.) [English summary $\frac{2}{3}$ p.] *Voeding*, 1952, 13: 227-40, bibl. 29, reprinted as *Overdruk Inst. Bewar. Verwerk. Tuinb-Prod. Wageningen* 35.

From a review of the literature it is shown that the nutritive value of calcium in vegetables is influenced by the ratio of the percentages oxalic acid/calcium. Only where this ratio is low is a high calcium content of value. This situation occurs in plants of the Cruciferae. Plants belonging to the orders Centrospermae and Polygonales (spinach, Swiss chard, New Zealand spinach, beet greens and rhubarb) all have a high oxalic acid/calcium ratio, which makes it difficult to obtain varieties with a low oxalic acid content by breeding and selection. Investigations are reported on the oxalic acid, calcium, magnesium, ascorbic acid and dry matter contents of different strains of spinach. No significant differences were found in the oxalic acid contents of the dry matter. The contents of oxalic acid, magnesium and calcium in the dry matter were positively correlated. The percentage of dry matter was markedly affected by the weather conditions preceding harvest. The percentage ascorbic acid in the dry matter was increased by sunny weather.

797. HO[UTER, P. J.].

De invloed van roedenmateriaal op de opbrengst van spinazie en tomaten in een onverwarmde kas. (The effect of sash bar material on the yield of spinach and tomatoes in a cold house.)

Jaarversl. Inst. TuinbTech. Wageningen, 1951, pp. 18-19.

Spinach showed no difference in yield between plants grown in cold houses with concrete, iron, or wooden sash bars and those in Dutch light houses, but in the first 2 houses higher yields were obtained from the south than from the north borders. In the case of

tomatoes significantly higher yields were obtained from houses with wooden sash bars than from any of the others, and all the south borders gave higher yields than the north ones. In the wooden house, the yield of grade A tomatoes was smallest and that of grade B tomatoes largest.

798. HO[UTER, P. J.].

Vergelijking van verschillende soorten kunstglas met gewoon glas op bakken bij de teelt van spinazie en postelein. (A comparison of different sorts of artificial glass with normal glass in frames for spinach and purslane culture.)

Jaarversl. Inst. TuinbTech. Wageningen, 1951, p. 20.

Temperature and yield records are tabulated. Thick glass and hardened glass gave higher temperatures than ordinary glass, and comparable yields. Yields under Perspex, Verre trempé and "doublethick" glass were similar to those under ordinary glass and higher than those under Isoflex and Windolite. Temperatures at 5 p.m. and yields were lowest under Isoflex on glass and Thermolux.

799. CHEO, P. C., POUND, G. S., AND WEATHERS, L. G.

The relation of host nutrition to the concentration of cucumber virus 1 in spinach.

Phytopathology, 1952, 42: 377-81, bibl. 8.

A study was made of the role of N, P, K, and a balanced solution in relation to plant growth and the concentration of cucumber virus 1 in spinach. With N there was optimum growth at 630 p.p.m.; above that level there was marked stunting. With P, in general, maximum growth occurred at 93 p.p.m. With K and balanced solutions, virus concentration appeared to be directly related to growth.

800. RAABE, R. D., AND POUND, G. S.

Relation of certain environmental factors to initiation and development of the white rust disease of spinach.

Phytopathology, 1952, 42: 448-52, bibl. 7, illus.

All commercial varieties of spinach (*Spinacia oleracea*) and 89 foreign introductions were found to be susceptible to white rust (*Albugo occidentalis*). The disease develops more rapidly at warm temperatures, but the pustules formed at lower temperatures are larger.—Univ. Wisconsin.

Tomatoes.

(See also 17, 62, 797, 845 l, q, w, 846d, i, 1088.)

801. NOVIKOF, V. A.

Situation actuelle et moyens d'amélioration de la culture de la tomate en Tunisie. (Tomato growing in Tunisia: the present situation and means of improvement.)

Tunis. agric., 1952, 53: 57-67, bibl. 9.

Tomato yields are very low at present (about half those obtained in France) owing to inadequate manuring and to salinity caused by inadequate drainage of irrigated soils. Lack of crop rotations and of phytosanitary rules favours the development of parasites, the most common of which are listed. Recommendations for improvement

are: (1) rotation of crops; (2) the avoidance of soils that have been irrigated for a long period or have been used for solanaceous crops within 3 years; and (3) an adequate manuring and fertilizer programme (of which details are given). Suitable varieties of tomato are listed and notes are given on sowing in the field and in the nursery, planting out (when the plants are 20 cm. high), spacing (at 1.25×1 m.), irrigation, pest control and harvesting.

802. ROLL-HANSEN, J.

Sortsøk med tomater på Statens forsøksgaard Kvithamar. (Tomato variety trials at the State Vegetable Research Station, Kvithamar.)

Reprinted from *Gartneryrket*, 1952, No. 1, pp. 3.

The leaf mould-resistant variety, Kvithamar, was included in these 1947-51 tests. It is reported to be of good quality.

803. FALK, K.

Sortsøk med tomater i hus. (Tomato variety trials.)

Reprinted from *Gartneryrket*, 1951, No. 48, pp. 4, being *Meld. Inst. Blomsterdyrk. Veksthusfors. norg. Landbr. Høgsk.* 45 [received 1952].

The results of 3 years' glasshouse trials with 8 tomato varieties, including the Norwegian variety Kvithamar No. 5, are tabulated and discussed. The tests were carried out at two horticultural colleges.

804. ANDEWEG, J. M., AND KEULS, M.

Practijkproeven tomaten 1948-1949. (Tomato variety trials, 1948-1949.) [English summary $\frac{1}{2}$ p.]

Meded. Inst. Vered. Tuinbouwgew. 20, 1950, pp. 31, illus. [omitted in error from *H.A.*, Vol. 21].

The trials described were organized by the Institute for Horticultural Plant Breeding, Wageningen, with varieties and strains of tomatoes, following the "Danish" system. They were carried out in commercial gardens in unheated Dutch glasshouses at several places in the Netherlands. The varieties and strains of good commercial value are classified according to type, strain and range of size. Work has now been started on the problem of choice of variety in relation to soil.

805. CRUCHET, P., AND PERRAUDIN, G.

Essai de variétés de tomates. (Tomato variety trials.)

Rev. hort. suisse, 1952, 25: 79-82.

A progress report of trials carried out at the research stations Mont-Calme, Lausanne and Chateaufort near Sion.

806. CHODAT, F., AND GAGNEBIN, F.

Documents génétiques et horticoles sur la tomate. (Genetical and horticultural characteristics of the tomato.)

Rev. hort. suisse, 1952, 25: 74-9, 114-19, 147-53.

Preliminary to carrying out further work on tomato improvement the authors, members of the botanical experiment station at Geneva University, made a survey of the genetical and botanical characters of this plant.

They contend that vegetable variety descriptions are generally inadequate for scientific purposes and they submit suggestions for more precise diagnosis.

807. LARSON, R. E., AND POLLACK, B. L.

The interactions of planting dates and strains as measured in maturity and productivity of tomatoes.

Proc. Amer. Soc. hort. Sci., 1952, 59: 377-83, bibl. 6, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1672.

Six tomato strains each planted on 3 different dates did not maintain the same relationships to one another as regards early production in the 3 trials. Thus a single trial is inadequate for assessing the early production performance of varieties. On the other hand total yields of the 6 strains maintained the same relationship to each other regardless of planting date.

808. REEVE, E., AND SCHMIDT, W. A.

Influence of plant spacing on canning tomato yields.

Proc. Amer. Soc. hort. Sci., 1952, 59: 384-8, bibl. 9.

In one trial in 1949 and 3 trials in 1950 close spacing to allow 7 to 8 sq. ft. per plant produced higher, and in 3 cases significantly higher, yields than wider spacing. Between spacings allowing $10\frac{1}{2}$ and 14 or 16 sq. ft. per plant differences were negligible, but yields fell sharply when spacings exceeded 16 sq. ft. Climatic conditions varied considerably in the 2 years, and in the first, which was for the most part hotter and drier than usual, there was a trend towards smaller sized fruit with close spacings.

809. LIMBERK, J.

Pokusy s roubváním nedřevnatých rostlin na rostliny dřevnaté. II. Roubvání rajských jablíček a papriky na kustovnici. (Experiments on grafting non-woody plants on woody plants. I. Grafting tomatoes and pepper on *Lycium barbarum*.) [French and Russian summaries $\frac{1}{2}$ p. each.]

Sborn. čes. Akad. Zeměd., 1951, 24: 335-40, illus.

At the Central Biological Institute at Praha-Dejvice tomatoes and pepper were grafted on *Lycium barbarum* and vice versa, safflower (*Carthamus tinctorius*) on sunflower (*Helianthus annuus*) and sunflower on Jerusalem artichoke (*Helianthus tuberosus*). Pepper and tomatoes on *L. barbarum* produced 2 normal sized fruits, each containing some viable seed. Sunflower on artichoke grew well, but gave a low yield of seed. Notes are given on the frost hardiness of the grafted material and on transmission of mosaic virus from a diseased *L. barbarum* to a tomato.

810.* LEONARD, E. R.

Some preliminary observations on the growth inter-relations of roots and tops of glasshouse tomatoes.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6.

A glass-sided box and glass-lined trench of dimensions to include the greatest depth of tomato roots found, were used at Cheshunt to study the inter-relations, during the growing season, of the two portions of the

* See note, p. 3.

tomato plant under commercial growing conditions. It has been found for one variety, one season and one type of cultural operation, that: (1) Stem length increases regularly throughout the growth period. (2) Leaf number on the main stem shows a steady rate of increase until about the time that ripening of fruit begins, and then a slow, progressive decrease in rate. Due to "leafing" an early, steady value is reached. (3) Roots of both 1 mm. and less than 1 mm. diameter show four consecutive phases of growth: (a) a rapid rise to peak value followed by (b) a marked decline. There is then (c) a gradual rise, with short term fluctuations, to (d) a new sustained high level towards the end of the season in the thinner roots but a continued decline in the thicker ones. These four phases in root development are also seen, if the total length is sub-divided into the lengths present in successive vertical layers of soil. The peak of root development between phases (a) and (b) is associated with the setting of the first fruit trusses and the recovery phase (c) with the removal, on harvesting, of the fruit from the lower trusses. [Author's summary.]

811. MONTELARO, J., HALL, C. B., AND JAMISON, F. S.

Studies on the nitrogen nutrition of tomatoes with foliar sprays.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 361-6, bibl. 13, being *Fla agric. Exp. Stat. J. Ser.* 34.

Urea sprays were tested on field-grown tomatoes in the Fall of 1950 and Spring of 1951. In the early stages of growth tomato plants were found to respond to nitrogen foliar sprays more slowly than to nitrogen applied to the soil at planting time. When compared with side-dressings of sodium nitrate, urea sprays did not significantly increase or decrease earliness of maturity, total weight or number of fruits harvested. [Authors' summary.]

812. LOBOV, M. F.

Transpiration of plants under different soil moistures. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, **81**: 101-4, bibl. 14.

The effect of soil moisture on the transpiration of plants was studied with particular reference to tomatoes, data being recorded for six varieties to show fruit yields under various percentages of soil moisture. Intensity of transpiration is found to depend particularly on the amount of water available; when the moisture is sufficient transpiration is greater than when soil moisture is deficient.

813. FÉLŐDY, L.

Paradicsomfajták vízforgalmára vonatkozó élettani kísérletek. (Physiological investigations on the water relations of tomato varieties.) [English and Russian summaries 1 p. each.]

Agrok. Talajt., 1951, **1**: 85-97, bibl. 8.

During earlier vegetative hybridization trials with 3 tomato varieties, only 2 combinations produced hybrid like forms. Detailed morphological and biochemical-physiological investigations suggested that changes due to vegetative hybridization occur only if the 2 components are physiologically dissimilar, i.e. have a different metabolism. As the water relation of plants comprises an important part of the metabolism, it was examined in the 3 varieties tested. The water regime of Ökörshív (Ox-heart) differed from that in the other two,

Szilva-alakú (Pruniform) and Aranyalma (Golden Apple), considerably and was the least balanced. The dry matter content of its fruit was the lowest, but at the end of a hot day the dry matter content of its foliage was the highest.

814. PROKOŠEV, S. M., PETROČENKO, E. I., AND BARANOVA, V. Z.

The variability of the tomatine content in tomato leaves. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, **83**: 261-4, bibl. 7.

Tomatine, a glycosidal alkaloid found in tomato leaves, is shown to increase with the maturity of the leaf, while the solanine content of potato leaves decreases during the season. The tomatine content of different species of *Lycopersicum* and different varieties of tomato was found to vary. The average for 4 varieties of *L. esculentum* var. *vulgare* on 10 August, 1950, was 0.63 mg. per 100 g. dry matter, and on 5 September it was 0.81 mg. For 5 varieties of *L. e.* var. *validum* the comparative figures were 0.82 and 0.93. The highest tomatine content found was 1.57 mg. per 100 g. dry matter in *Lycopersicum pimpinellifolium*. Tomatine has a repellent action on Colorado beetles, and contributes to the partial resistance of tomatoes to that insect's attack.

815. BISWAS, T. D., AND DAS, N. B.

Chromatographic separation of carotene in materials containing lycopene.

Sci. and Cult., 1952, **18**: 91-2, bibl. 8.

An adsorbent mixture of activated magnesia and kieselguhr was used for the chromatographic determination of carotene in tomatoes. In the mature fruits of 26 local and imported varieties of *Lycopersicum esculentum* carotene ranged from 2.2 to 12.8 p.p.m., while fruits of 2 varieties of *L. pimpinellifolium* contained 14.8 and 15.7 p.p.m. Fully ripe fruits appeared to contain more carotene than less ripe ones.

816. TEUBNER, F. G., AND MURNEEK, A. E.

Effect of *p*-chlorophenoxyacetic acid (CIPA) and 3-indoleacetic acid (IA) on certain dehydrogenase systems of the tomato fruit, *L. esculentum*.

Science, 1952, **116**: 39-41, bibl. 11, being *J. Ser. Pap. Mo. agric. Exp. Stat.* 1295.

Dipping tomato fruit clusters 6 days after pollination in aqueous solutions of 200, 1,000 and 2,000 p.p.m. CIPA gave responses similar to those obtained from flower sprays of 5, 25 and 50 p.p.m. CIPA. Dehydrogenase activity was measured in fresh tissue homogenates by the reduction of 2,3,5-triphenyltetrazolium chloride (TCC) in the presence of several substrates. The application of 200 p.p.m. had little effect on fruit set or dehydrogenase activity. Dipping in 1,000 p.p.m. produced the best fruit set and development and also resulted in increased reduction of TCC in the presence of sodium malate and sodium fumarate as compared with untreated controls. Dipping in 2,000 p.p.m. resulted in fruit malformations including "blossom end rot" and in lower reduction of TCC in the presence of malate and fumarate. With 2 other substrates, sodium glutamate and sodium succinate, reduction of TCC was lower for all concentrations of CIPA than in homogenates from untreated control fruits. The addition of concentrations of IA, corresponding to those used of CIPA, to

homogenates prepared from control fruits 28 days after the CIPA treatments gave closely similar results in the reduction of TCC. It is concluded that the evidence supports the hypothesis that the effect of growth regulators of the auxin type is exerted through dehydrogenase enzyme systems.

817. RATNER, E. I., AND AKIMOČKINA, T. A.
The effect of growth substances on fruit formation in tomatoes in relation to conditions of mineral nutrition. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, 79: 689-92, bibl. 7.

Results obtained indicate that plants receiving 2 g. N and giving least response to growth substances showed increased sugar content in all leaves, with insignificant change in the proteid content. Leaves of plants giving the greatest response showed a marked fall in sugar content as a result of an increased proteid synthesis. The latter circumstance together with a marked increase in leaf weight, size and assimilation, was detrimental to the development of reproductive organs.

818. PASZEWSKI, A., PIASECKA, J., AND GRZE-SIUK, S.
Wpływ obarczowania na owocowanie pomidorów. (The influence of ringing on tomato yields.) [English and Russian summaries 3½ and 2½ pp. respectively.]
Ann. Univ. Mariae Curie-Skłodowska, Sect. E, 1951, 6: 361-81, bibl. 9.

Further data are presented on results of ringing tomatoes by removal of a strip of cuticle and with metal rings [see also H.A., 19: 1286]. Both treatments increased total yield and yield of marketable crops, particularly of early and late pickings, and reduced the percentage of diseased fruits as compared with controls. Ringing by bark removal is, however, laborious and unsuitable for large scale tomato production, but fixing iron bands of about 9 mm. diameter above the third leaf at the time of transplanting is considered an economical method of inducing increased cropping.

819. HUNTER, J. A.
Sodium alginate and carboxymethyl cellulose as substitutes for rotted organic material in soil mixtures.
N.Z. J. Sci. Tech., Sect. A, 1952, 34: 186-91, bibl. 3.

Sodium alginate (Manucol 2) and carboxymethyl cellulose (Cellofas B) were tested for their suitability to replace rotted organic material commonly used in soil mixtures for tomato plants. The work was done under glass during the winter and spring seasons of 1949 and 1950. Under the conditions of the experiments sodium alginate did not give results which would justify its use as a substitute for the organic material used. The possibility of substituting carboxymethyl cellulose for the organic material, up to the planting-out stage in flats and to maturity in pots, was indicated, provided that the normal fertilizer mixture was added. [Author's summary.]

- 820.* VAN DER KLOES, L. J. J.
Fertilizer treatment of tomatoes in glass-houses.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 15, bibl. 120.

* See note, p. 3.

From Dutch experiments quoted, the proper ratio of N, P₂O₅ and K₂O fertilizers was determined as 1-1-2. The ratio mentioned does not apply to every stage of growth. The dose of nitrogen must be smaller when the crop is young than at a later stage of growth. The need for P₂O₅ is rather high at the very first stages of development whereas its availability is low then. Potash becomes of great importance when the fruit begins to ripen and while the plants are young it represents a growth-regulating factor dependent on temperature and light intensity. The habit of the plant and, associated with it, early maturity are mainly determined by the N-K balance. The latter also affects the quality of the yield and the occurrence of parasitic diseases. Magnesium probably affects the quality of the fruits in the same way as calcium. The effect of these elements requires further research. The data on quantities of fertilizers applied are interpreted according to calculations of yields that have been attained in the experiments per unit of nutrient. The remunerative effect per unit depends very much on attendant circumstances, such as the volume and suitability of the soil available for rooting, temperature, intensity of light, etc. On the average, about 400 grams of tomatoes were harvested per gram of N and of P₂O₅ and per 2 grams of K₂O, equal to a required application in practice of about 2.5 kg. of nitrogen, 1.75 kg. of P₂O₅ and 4.5 kg. of K₂O per acre [or approx. 222, 156 and 400 lb. per acre respectively]. [Author's summary.]

821. NEWTON, H. P., AND TOTH, S. J.
Response of crop plants to I and Br.
Soil Sci., 1952, 73: 127-34, bibl. 15.

Applications of KI were made to nine New Jersey soils, and tomatoes were used to test the effect of the added I. Residual effects of the I additions were studied on buckwheat as a test crop. A preliminary test was made of the effect of Br additions. I-Cl and I-Br relationships in tomatoes were studied by solution-culture methods. Yield responses were not obtained with tomatoes on any of these soils when I was applied at rates of 1 and 10 lb. an acre. Addition of Cl as KCl tended to increase toxicity symptoms of I in soil cultures and also to increase I uptake by both tomatoes and buckwheat. The Br content of leaflets of tomatoes grown in the tests ranged from less than 4 p.p.m. to 2,825 p.p.m. depending on the amount of Br present in the nutrient solution.

822. POPOVSKAJA, E. M.
The role of nitrogen and the water regime in the formation and accumulation of ascorbic acid in tomatoes. [Russian.]
Biohimija, 1952, 17: 145-53, bibl. 23.

A detailed description is given of sand culture experiments with tomatoes, the more important results of which are tabulated. It is shown that heavy N applications reduced the ascorbic acid content of both leaves and fruits. N applied to plants provided with optimum rates of P increased the ascorbic acid content. Lack of N reduced the growth and yield of plants, and N applied even when the fruit was set increased yields. N was only beneficial, however, when sufficient moisture was available, and lack of water in plants receiving high N treatment reduced yields. The addition of N under normal moisture conditions increased the total ascorbic acid content by reason of increased yields. The quantity of chlorophyll in the leaves was found to depend directly

on the N nutrition of the plants, but had no direct connexion with ascorbic acid concentration. The increase in the rate of N led to the accumulation of N compounds in the plant tissues, but reduced the concentration of sugars, which in turn led to a reduced ascorbic acid content.

823. RUGE, U.

Ertragssteigerung bei Tomaten und Bohnen, bedingt durch eine Blütenspritzung mit Hexachlorcyclohexan. (Yield increases in tomatoes and beans induced by BHC blossom sprays.)

Angew. Bot., 1952, 26: 130-8, bibl. 8.

In preliminary pot trials carried out in 1950 the author found that yields of dwarf beans and tomatoes were markedly increased by blossom sprays of BHC (50 mg./l.). A repetition of the experiment on a larger scale confirmed the earlier findings and showed that [the α - and especially the γ -isomers were particularly promising. (1) *Bean*. The sprays were applied twice, at the beginning of blossoming and 8 days later, each time at the rate of 4-5 l. per 60 plants so that every plant received a total of 0-004 g. BHC. As the spray was applied at a low dosage and with a chemically pure preparation no tainting occurred, the flavour being, if anything, improved. The colour and general appearance after cooking is described as much superior to that of the controls. (2) *Tomato*. Two sprays were applied, by atomizer, at the rate of 2 c.c. per truss at an interval of 8 days. It is calculated that 0-001-0-00015 g. was deposited on each truss, 8 trusses being treated per plant. The α - and γ -isomers were shown to increase total yields by 24-7 and 22-4% respectively, but the greatest advantage was the increase in the weight of the early crop brought about by the γ -isomer. In contrast, the total yield increase from the application of a 2,4-D preparation was only 7-2%, though the increase in the very early crop surpassed that of plants treated with BHC. Again, the quality of the BHC fruits was in some points superior to that of the controls and greatly superior to that of the 2,4-D fruits, which a tasting panel rejected as insipid. —Hochschule für Gartenbau, Hanover.

824. LINN, M. B., AND WRIGHT, J. M.

Tomato diseases and insect pests: identification and control.

Circ. Ill. agric. Ext. Serv. 428, revised 1951, pp. 55, illus.

In this comprehensive, well illustrated circular 21 tomato diseases are discussed in the approximate order in which they appear during an average growing season in Illinois. The life history, habits and injury caused by 10 tomato insects are briefly described and measures for their control are suggested. General notes are given on seed treatment, soil sterilization, fungicides, insecticides and spraying and dusting equipment.

825.* BEWLEY, W. F.

Virus free seeds and the tomato grower.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 3.

The author describes how it was found possible at Cheshunt to plant a small block of 2 houses with plants from virus-free seeds and keep the plants free from virus infection throughout their lives by simple precautions.

* See note, p. 3.

826. KLINKOWSKI, M., AND USCHDRAWIT, H. A.
Die Bronzefleckenkrankheit der Tomate, eine bisher in Deutschland noch nicht beobachtete Viruserkrankung. (Spotted wilt, a virus disease of tomato not hitherto observed in Germany.)

Phytopath. Z., 1952, 19: 269-83, bibl. 29, illus.

Tomato spotted wilt is reported as causing serious loss in the early summer of 1950 at Könnern in central Germany. Previous work on the disease by workers in other countries is reviewed and the authors' own observations are recorded, with a list of host plants arranged in families, and notes on control.—Halle University.

827. SUHOV, K. S., VOVK, A. M., AND MUŠNIKOVA, K. S.

Trials with DDT dust for the control of stolbur disease of tomatoes. [Russian.]

Doklady vsesojuz. Akad. sel'sk. Nauk, 1952, No. 8, pp. 24-7.

In southern Russia stolbur disease, transmitted by a cicade [*Hyalesthes obsoletus*] causes great damage to tomatoes and other Solanaceae. DDT dust applied 3-5 times during the season at the rate of 40 kg. per ha. gave a substantial reduction in infection not only on tomatoes but also on eggplants, peppers and potatoes. The use of BHC, on account of the off-flavour it imparts, was found impracticable. Apart from DDT treatment, a dense stand of tomatoes (not less than 25-30,000 plants per ha.), planting of relatively resistant "stemmed" [or upright] varieties and weed control, particularly of convolvulus and cress, are recommended for the control of this disease.

828. PANJAN, M.

Ispitivanje stolbur-a Solanaceae i način suzbijanja. (Investigations on stolbur disease of Solanaceae and methods of its control.)

[French summary 10 lines.]
Zasht. Bilja, Belgrade, 1950, No. 2, pp. 49-58, bibl. 16, illus. [received 1952].

Stolbur [woodiness], caused by big bud virus, of tomatoes is widespread in Yugoslavia. The virus was also found in tobacco, potato and *Atropa belladonna*, but was not established with certainty in pepper. In experiments in 1948 to control its vectors, cicades including *Hyalesthes obsoletus*, 3 DDT or BHC applications reduced the infection to 3% and 4% respectively, compared with 20-47% infection of untreated plants. The treatment should begin before the appearance of symptoms. Both insecticides were found phytotoxic, but DDT less so than BHC. In inoculation tests *Solanum racemigerum* and its hybrids proved susceptible, *S. ochroleucum* and *S. douglasii* resistant.

829. COSTA, A. S.

Further studies on tomato curly top in Brazil.

Phytopathology, 1952, 42: 396-403, bibl. 13, illus.

In tomato plantings in São Paulo there is another virus in addition to the *brasiliensis* variety of the sugar beet curly top virus. The new virus is transmissible by the leafhoppers *Agalliana ensigera* and *A. sticticollis*. Its host range is restricted; tomato, currant tomato (*L. pimpinellifolium*), jimson weed, and *Solanum nigrum* were found to be susceptible. The name *Ruga verrucosans* Carsner and Bennett var. *solanacearum* is proposed

for the new virus.—Instituto Agronomico, Campinas, São Paulo, Brazil.

830. USCHDRAWITZ, H. A.

Die Bedeutung des Tabakmosaikvirus und des Kartoffel-X-Virus für den Tomatenanbau. (The significance of tobacco mosaic virus and potato virus X for the culture of tomatoes.)

Angew. Bot., 1952, 26: 118-29, bibl. 8.

Trials with over 50 tomato varieties and some tomato species grown in the field indicated that losses in yield from virus infection are severe even if the symptoms are masked. An examination of cigarettes, cigars and tobaccos marketed in Germany showed that most brands are carriers of mosaic. Using *Nicotiana glauca* as an indicator plant the author separated two strains of the virus, one of which (Sn) causes localized necrotic lesions while the other (Ss) becomes systemic without inducing primary lesions. All the samples of tobacco studied contained either a combination of the two strains or the Ss strain alone, whereas in tomatoes the author only found the Sn strain. It is therefore possible that the danger of tomato infection by contact with tobacco has been overrated, though no slackening of precautions is as yet justified. In view of the dangerous combination of viruses TM+X, contact with potatoes should also be carefully avoided. The importance of other sanitary measures, such as the selection of healthy plants for seed, disinfection and soil sterilization, is emphasized.—Biol. Zentralanst. Land- u. Forstw., Berlin-Dahlem.

831. LESLEY, J. W., MIDDLETON, J. T., AND MCCARTY, C. D.

Simi, a processing tomato resistant to verticillium and fusarium wilts.

Hilgardia, 1952, 21: 289-99, bibl. 8, illus.

The wilt-resistant tomato Simi, which is recommended for planting in coastal regions of southern California, is described and compared as to composition with the variety Pearson and in a few respects with San Marzano. A short account is given of the two wilt diseases and evidence on the existence of strains of *Verticillium albo-atrum* is discussed.

832. KERN, H.

Über die Beziehungen zwischen dem Alkaloidgehalt verschiedener Tomatensorten und ihrer Resistenz gegen *Fusarium lycopersici*. (The relation between the alkaloid content of tomato varieties and their resistance to *Fusarium lycopersici*.)

Phytopath. Z., 1952, 19: 351-82, bibl. 74.

The alkaloid tomatin content of tomato varieties has not been found to affect their infection by the wilt fungus *Fusarium lycopersici*.

833. BRIAN, P. W., AND OTHERS.

The phytotoxic properties of alternaric acid in relation to the etiology of plant diseases caused by *Alternaria solani* (Ell. & Mart.) Jones and Grout.

Ann. appl. Biol., 1952, 39: 308-21, bibl. 19, illus.

Alternaric acid, a metabolic product of some strains of *Alternaria solani*, is highly phytotoxic. If introduced

into the vascular system of cut shoots of tomato or potato, it travels upwards and causes necrotic lesions of the stem, petioles and leaf blades, very similar in appearance to the lesions appearing in some phases of natural attack by *A. solani*. Alternaric acid also produces similar lesions on plants outside the host-range of *A. solani*. Associated with the production of visible lesions is a disturbance of the water-balance of shoots. Transpiration is increased and, in spite of a simultaneous but smaller increase in water uptake, this eventually leads to complete desiccation of the shoots. A strain of *A. solani* known to produce alternaric acid in synthetic culture media produces a substance with similar biological properties when inoculated into tomato fruits. Since other workers have shown that some of the symptoms of *A. solani* attack are toxigenically induced, it is tempting to suggest that alternaric acid is the toxin concerned. On the other hand, there is no correlation between virulence of strains of *A. solani* and their ability to produce alternaric acid in synthetic culture media or in tomato fruits. Some highly virulent strains produce little or no alternaric acid under any conditions tested. There is some evidence that other toxins beside alternaric acid are produced by *A. solani*, not necessarily in the same proportions by all strains. [Authors' summary.]

834. MCCOLLOCH, L. P., AND WORTHINGTON, J. T.

Low temperature as a factor in the susceptibility of mature-green tomatoes to *Alternaria* rot.

Phytopathology, 1952, 42: 425-7.

Tests with mature-green tomatoes held at 32° F. for various periods before inoculation and with fruit held at various temperatures between 32° and 70° after inoculation, indicate that tomatoes at this stage of maturity are weakened by holding at low temperatures and that low-temperature injury causes them to become susceptible to rot produced by *Alternaria tenuis*.—Plant Ind. Stat., Beltsville, Maryland.

835. CICCARONE, A., AND CARILLI, A.

Prove di lotta contro *Alternaria porri* (Ell.) Saw.F.Sp. *solani* (E. et M.Pro sp.) Neerg. in agro di Scafati (Salerno). (Experiments in the control of *Alternaria porri solani* near Salerno.) [English summary ¾ p.] Ann. Sper. agrar., 1952, 6: 1077-92, bibl. 19, illus.

In randomized chemical control tests in 1951 tomato plants raised from disinfected seed were sprayed 5 times at 10-day intervals beginning on 5 July with 1.5% bordeaux mixture or 1% salicylanilide or 3.5% thiram (tulisán), but none of these treatments was entirely satisfactory. In varietal trials Southland was significantly the most resistant. Microelement tests with Mo, B, Mn, Zn, Fe and Mg were negative.—Plant Path. Stat., Rome.

836. GALLEGLY, M. E.

Physiologic races of the tomato late blight fungus.

Phytopathology, 1952, 42: 461-2, being Sci. Pap. W. Va. agric. Exp. Stat. 451.

There appears to be no resistance to late blight (*Phytophthora infestans*) in the common commercial varieties

of tomato, but there is resistance in some of the wild types. As in the potato strain of the fungus there are pathogenic races in the tomato strain.

837. MAI, W. F.
Susceptibility of *Lycopersicon* species to the golden nematode.
Phytopathology, 1952, 42: 461, bibl. 3.
All varieties tested of *L. peruvianum*, *L. glandulosum*, *L. pimpinellifolium*, *L. hirsutum* and *L. esculentum* proved susceptible to attack by the golden nematode, *Heterodera rostochiensis*.
838. ANDEWEG, J. M., AND OTHERS.
Proeven met tomaten-onderstammen resistent tegen het wortelknobbelaaltje. (Experiments with tomato rootstocks resistant to root-knot eelworm.) [English summary 10 lines.]
Meded. Dir. Tuinb., 1952, 15: 255-64, bibl. 2, illus.
By grafting tomatoes on to certain varieties (*Lycopersicon peruvianum* and crosses) resistant to the root-knot nematode (*Heterodera marioni*), substantially higher yields were obtained in infested soils. The technique, "axillary cleft grafting", is described.
839. STANILAND, L. N., AND STONE, L. E. W.
Symphylid damage to tomatoes.
Plant Path., 1952, 1: 87-8, illus.
A "root-death" disorder of tomato plants, mostly under glass, in the South-Western Province of England, is caused by symphylids (*Scutigerella immaculata*) which feed on the root hairs, the absence of which is a useful diagnostic symptom of symphylid infestation. A small piece of cotton wool placed inside the pot over the hole, before potting-up, is effective in preventing the entry of symphylids, another method being to stand the pots with the holes resting on small pieces of cotton wool. Ball-watering with Parathion (20%) at 1 fl. oz. per 100 gal. of water was outstandingly effective in control trials.—N.A.A.S., Bristol.
840. MUSTARD, M. J.
The use of Latex VL-600 as a surface coating for tomatoes.
Proc. Fla St. hort. Soc. for 1951, pp. 105-9, bibl. 8.
Mature-green tomatoes immersed in Latex VL-600 plus a spreader for about 10 sec. ripened at a significantly slower rate and had a significantly longer storage life than waxed or untreated tomatoes. The latex treatment did not detract from the appearance or flavour of the fruit.
841. SPURLOCK, A. H.
Packing labor and returns for tomatoes by type of container.
Proc. Fla St. hort. Soc. for 1951, pp. 128-30.
Returns and costs were analysed throughout 2 seasons in a large packing house in Florida. Packing costs were higher per lb. for tomatoes packed in 36 lb. lugs than in 62 lb. bushel boxes; with the latter both container costs and labour were reduced. Net receipts to the grower were usually slightly more for bushel containers than for lugs.
842. SHOWALTER, R. K., HALSEY, L. H., AND MCCOLLOCH, L. P.
Injuries in shipping and handling tomatoes.
Proc. Fla St. hort. Soc. for 1951, pp. 125-8.
Studies covering 4 years have shown that mature-green tomatoes can be satisfactorily shipped by lorry from Florida to northern markets packed in 30 lb. lugs or in 60 lb. wirebound or nailed boxes or in field boxes, provided they are properly filled, carefully loaded, sufficiently cooled and promptly unloaded. The lidded and lined wirebound and nailed boxes generally gave better results than the other two containers, especially when slack developed in the load. For rail shipments field boxes were unsatisfactory and 30 lb. lugs were slightly better than the two 60 lb. boxes.
843. LOBJOIT, J. P.
Tomatoes.
Fruitgrower, 1952, No. 2955, pp. 257-8.
Tomatoes were successfully ripened in gas chambers, preferably constructed of moisture absorbing material, in which the humidity was maintained at 80% and the temperature at 72° F. A third of the total quantity of ethylene gas was injected once every 48 hrs, the total being 2 parts to a 1,000 of air, and at the end of every 6th day the air in the chambers was changed. This method of ripening is recommended for the first few trusses of fruit, the removal of which enables the plants to produce an earlier and greater yield of subsequent trusses, and also to finish the crop. The author further suggests that tomatoes should be roughly graded at picking.
844. VAN DAME, H. C.
Report on succinic acid in tomatoes.
J. Ass. off. agric. Chem. Wash., 1952, 35: 523-30, bibl. 3.
(1) Canning and storage of tomatoes for periods of a year do not appear to cause formation of succinic acid.
(2) A relatively large amount of succinic acid is produced in tomatoes by molds which produce rot. [Author's conclusions.]—Food and Drug Administration, Cincinnati.

Noted.

845.
a ANDERSON, C. W.
Viruses of cucurbits in central Florida.
Proc. Fla St. hort. Soc. for 1951, pp. 109-12, bibl. 21.
b ANON.
Die Normengebung für die Gemüseverpackung in Frankreich. (Regulations on the packing of vegetables in France.)
Gemüseb., 1952, 15: 156-9, 163-4.
c ARGIKAR, G. P.
Solanum melongena var. *bulsarensis* var. *nova*, Argikar.
Curr. Sci., 1952, 21: 226-7.
An unusual eggplant, found to breed true, is described.

- d BALDINI, E.
Note genetiche e pratiche per il miglioramento delle razze di peperone. (Genetical and practical notes on the improvement of *Capsicum* pepper varieties.) [English summary 7 lines.]
Ann. Sper. agrar., 1952, 6: 951-71, bibl. 22, illus.
- e* BATEMAN, A. J.
Methods of vegetable breeding.
[*Mim. Pap.*] 13th int. hort. Congr., London, pp. 8, bibl. 11.
A review.
- f BREMER, H.
Salatmosaik: ein Sammelbericht. (Lettuce mosaic; a review.)
Z. PflKrankh., 1952, 59: 275-7, bibl. 20.
- g BURGIS, D. S.
Mulching vegetable crops with aluminium foil.
Proc. Fla St. hort. Soc. for 1950, pp. 141-4, illus. [received Nov. 1952].
A shorter account was abstracted in *H.A.*, 22: 468.
- h CICCARONE, A.
Note fitopatologiche. III. Osservazioni intorno ad epifizie di *Peronospora pisi* (de By.) Syd. nel Casertano. (Phytopathological notes. III. A case of *Peronospora pisi* infection in the Caserta area.) [English summary 6 lines.]
Ann. Sper. agrar., 1952, 6: 1065-7, bibl. 10.
- i CLARKE, A. E., POLLARD, L. H., AND HAWTHORN, L. R.
Effect of time of seeding on the winter survival and subsequent seed stalk development of onions.
Proc. Amer. Soc. hort. Sci., 1952, 59: 439-44, bibl. 2.
In northern Utah.
- j CREMER, H. D.
Die ernährungsphysiologische Bedeutung von Topinambur. (The nutritional value of Jerusalem artichoke.)
Landw. Forschung, 1952, 2. Sonderheft, p. 104.
- k DANISH SEED TESTING STATION (STAHL, C.).
Beretning fra Statsfrøkontrollen for det 80. arbejdsår fra 1. juli 1950 til 30. juni 1951. (Eightieth Report of the Danish Seed Testing Station for the year 1 July 1950-30 June 1951.) [English summary 2½ pp.]
Tidsskr. Planteavl, 1952, 55: 369-432.
- l FINLAY, K. W.
Inheritance of spotted wilt resistance in the tomato. 1. Identification of strains of the virus by the resistance or susceptibility of tomato species.
Aust. J. sci. Res., Ser. B, biol. Sci., 1952, 5: 303-14, bibl. 12, illus.
- m FORSEE, W. T., JR., AND HILLS, W. A.
Fertilizer experiments with some vegetable crops on sandy soils of eastern Palm Beach county.
Proc. Fla St. hort. Soc. for 1951, pp. 92-5, bibl. 11.
Snap beans and sweet corn.
- n FRY, P. R.
Note on occurrence of a tobacco-necrosis virus in roots of lettuce showing big-vein.
N.Z. J. Sci. Tech., Sect. A, 1952, 34: 224-5, bibl. 5, illus.
- o JOUBERT, C. J.
The onion thrips and "witroes" in onion plants.
Fmg S. Afr., 1952, 27: 420.
The pest and its control with DDT.
- p KAHN, R. P.
An investigation of asparagus rust and its causal agent, *Puccinia asparagi* D.C. in Illinois.
Dissertation Abstracts,* 1952, 12(1): 9, Microfilm copies of complete manuscript 81 pp. at \$1.01 from Univ. Microfilms Ann. Arbor, Michigan.
- q† VAN DER KLOES, L. J. J.
Some factors determining the quality of the soil for the production of tomatoes under glass.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 4, bibl. 4.
Such as the depth and composition of the soil water.
- r LELLIOTT, R. A.
A new bacterial disease of leeks.
Plant Path., 1952, 1: 84, illus.
Pseudomonas species.
- s MAHMUD, K. A.
Pythium damping-off of brinjal [eggplant] seedlings.
Sci. and Cult., 1952, 18: 149-50, bibl. 3.
Due to *P. aphanidermatum*.
- t MIHAĬLOVA, L. V.
Changing cabbage into rape. [Russian.]
Agrobiologija, 1950, No. 4, pp. 38-44, bibl. 1, illus. [received 1952].
- u MINISTERIE VAN LANDBOUW, NEDERLAND.
De koolvlieg, *Chortophila brassicae* Bché. (The cabbage root fly.)
Vlugschr. PlZiekt. Dienst Wageningen 10, 1952, pp. 4, illus.
- v MINISTRY OF AGRICULTURE, LONDON.
Cabbage root fly [*Erioischia* (*Chortophila*) *brassicae*].
Adv. Leafh. Minist. Agric. Lond. 18, 1952, pp. 5, illus.

* See note, p. 3.

* \$6.00 a year, Univ. Microfilms Ann. Arbor, Mich.

† See note, p. 3.

W NASON, A., OLDEWURTEL, H. A., AND PROPST, L. M.
Role of micronutrient elements in the metabolism of higher plants. I. Changes in oxidative enzyme constitution of tomato leaves deficient in micronutrient elements. *Arch. Biochem. Biophys.*, 1952, 38: 1-13, bibl. 18, being *Contr. McCollum-Pratt Inst.* 24.

X NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
Moisture test for grains and seeds. An oil distillation method. *Tech. Memo. N.I.A.E.* 7/C/144/J.W., 1949, pp. 11, bibl. 3 [received 1952].

Y NILSSON, E.
Drivgurka. (Glasshouse cucumbers.) Reprinted from *Svensk Växtförädl.* [1951?], pp. 237-54, bibl. 11, illus.
Breeding work with glasshouse cucumbers.

Z NOLTE, H.-W., AND KÖHLER, H.
Pflanzenschädigungen bei Nematodenbefall und ihre kausalen Ursachen. (Plant injuries due to nematodes and their causes.) *NachrBl. dtsh. PflSchDienst, Berlin*, 1952, 6: 24-8, bibl. 12, illus.

846.

a OGATA, K.
Studies on the storage of perishable agricultural products. IV. On the storage of onions. (2) On the size and keeping quality of the onion and its metabolism during the storage period. [Japanese.] *J. hort. Ass. Japan*, 1952, 21: 29-36, bibl. 18, illus.

b PARRIS, G. K., AND ANDRUS, C. F.
The Ironsides watermelon. A new fusarium wilt-resistant variety. *Circ. Fla agric. Exp. Stat.* S-21, 1950, pp. 4, illus. [received 1952].

c READ, W. H.
The chemical control of glasshouse pests and diseases. *J. Sci. Food Agric.*, 1952, 3: 337-42, bibl. 21. A review.

d SCHULTZ, J. H., AND KELLY, E.
A study of ascorbic acid content and fruit size in tomatoes segregating for those characters. *Proc. Amer. Soc. hort. Sci.*, 1952, 59: 458-62, bibl. 6.

e* SNEEP, J.
Selection and breeding of some brassica plants. [*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 5.
Cabbage, cauliflower and brussels sprouts.

f STATENS FORSGØSVIRKSOMHED I PLANTEKULTUR.
Dyrkningsforsøg med stammer af asie-agurker 1946-50. (Variety trials with cucumbers for pickling.) *Tidsskr. Planteavl*, 1952, 55: 554-6, being *Medd. Stat. Forsøgsvirks. Planteakult.* 468.

g TATEBE, T.
Studies on the behaviour of incompatible pollen in *Brassica*. IV. *Brassica oleracea* L. var. *capitata* L. and var. *botrytis* L. [Japanese with English summary 1½ pp.] *J. hort. Ass. Japan*, 1951, 20: 19-26, bibl. 11. Based on 3 cabbage and 2 cauliflower varieties.

h VIRTANEN, A. I., AND SAUBERT-VON HAUSEN, S.
A method for determining, in pea cultures, the amount of molecular nitrogen fixed and the amount of combined nitrogen taken up from the soil. *Plant and Soil*, 1952, 4: 171-7, bibl. 4.

i WIELING, U.
Morphologische und anatomische Untersuchungen über die phyllogenen Sprossungen bei *Solanum lycopersicum* L. (A morphological and anatomical study of phyllogenous shoots in *Solanum lycopersicum*.) *Biol. Zbl.*, 1952, 71: 415-37, bibl. 15.

* See note, p. 3.

TOBACCO.

General.

(See also 121s, 358, 693, 1088, 1225, 1231, 1372, 1402, 1407.)

847. VAN DER VEN, R.
Het eerste wereldcongres voor tabak. (The first world congress on tobacco.) [English summary ½ p.] *Meded. Dir. Tuinb.*, 1952, 15: 293-311.

In this account of the first International Tobacco Congress, held at Amsterdam, 17-24 September 1951, reports and papers were presented on tobacco cultivation, the natural science of tobacco (genetics, biology, chemistry), the technology of processing, economics, and international collaboration.

848. MORTEN, I. H.
The Southern Rhodesian tobacco industry. *World Crops*, 1952, 4: 232-4, illus.

A short historical account is given of the rapidly expanding tobacco industry of Southern Rhodesia and of methods of cultivation, curing and grading.

849. STINSON, F. A.
Tobacco research in Southern Rhodesia. *World Crops*, 1952, 4: 234-6.

Research work under the control of the Southern Rhodesia Tobacco Research Board, at Trelawney and elsewhere, is largely concerned with cropping systems, nutritional requirements, the control of pests and diseases, variety trials, chemical control of suckering,

and seed bed sterilization. Mention is made of the discovery during the past season that Mg deficiency is responsible for "sand drown".

Varieties and breeding.

850. KADAM, B. S., ANANTHARAMAN, R., AND RADHAKRISHNA MURTY, B.
Harrison Special variety in Northern Circars.

Indian Tobacco, 1952, 2: 81-7, bibl. 2.

Comparison of local strains with imported Harrison Special revealed little or no difference in yield, flower colour, and range and intensity of flowering. Selections made revealed significant differences in height and type of inflorescence. The variety is being selected and in a year or two small quantities of pure seed will be available for growers.—Centr. Tob. Res. Inst., Rajahmundry.

851. THOMSON, R.

Trials of flue-cured tobacco varieties.

N.Z. J. Agric., 1952, 84: 199-202.

Yields are tabulated for a period of 7 years for over 20 varieties, most of which are briefly described. Harrison's Special 215 has consistently outyielded the others and has produced a good quality leaf. It has a moderate degree of resistance to black root rot and produces relatively few laterals. Broadleaf is a good wide leaf variety of fine texture, but is very susceptible to black root rot. Of the 400 group, Special 400 was the best. The Canadian varieties have been disappointing. The Oxford varieties were produced for resistance to specific diseases, and as these diseases have not been recorded in New Zealand these tobaccos have no place under local conditions.

852. ALCARAZ MIRA, E.

Estudios del crecimiento de algunas variedades de tabaco. (Growth studies on some tobacco varieties.) [English summary $\frac{1}{2}$ p.] *Bol. Inst. Invest. agron. Madrid*, 1952, 12: 1-55, bibl. 5, illus.

Detailed results are given of research at the Tobacco Biology Institute, Seville. Growth at various spacings was studied in one Macedonian and 4 Near Eastern varieties; Brussa Akchi Dere at 0.1 m. apart in double lines 0.6 and 0.2 m. apart yielded 4,370 kg. per ha. compared with 2,170-2,830 kg. in the others set at optimum spacing. Growth measurements and photographic records of growth with and without topping were made of the cigarette variety, Havana 142, at 1.0×0.9 m.; the rate of growth of the leaves was found to be closely related to their size. A similar photographic record of the local variety Valencia was kept. Growth studies in sun and shade of the cigarette variety, Sumatra 860, at 0.9×0.7 m. showed that development in the shade is slightly slower but continues longer so that the plants eventually reach a greater size.

853. POGLIAGA, H. H.

Híbrido intergenérico *Nicotiana* \times *Petunia*. (An inter-generic hybrid, *Nicotiana* \times *Petunia*.)

Rev. argent. Agron. B. Aires, 1952, 19: 171-8, bibl. 4, illus.

Attempts were made to hybridize *Nicotiana tabacum* and *Petunia parodii* with a view to determining the closeness of their relationship and, possibly, to using the resulting hybrids in tobacco breeding. A sterile hybrid with 31 chromosomes was obtained.

Growth phenomena.

854. ČIRKOVSKIĖ, V. I.

The formation of tobacco seed in relation to the position of pods in the inflorescence, [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 85: 225-8, bibl. 3, illus.

Data are presented showing that the pods near the centre of the inflorescence of 2 tobacco varieties examined were larger and contained a greater number of heavier seeds than those situated on the periphery. The seeds of the outer pods developed later in the season, often under unfavourable weather conditions, but by removing the inner pods their quality was greatly improved, and they may provide valuable material for breeding cold resistant tobacco varieties.

855. VOLODARSKIĖ, N. I.

The character of the formation of lateral shoots in tobacco in relation to their height on the stem. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 79: 677-80, bibl. 2, illus.

The vigour of the growth of the side shoots in tobacco depends on the stage of development of the tissues; it gradually diminishes from the base to the apex of the plant.

856. PETERSEN, E. L.

Controlling tobacco sucker growth with maleic hydrazide.

Agron. J., 1952, 44: 332-4, bibl. 6.

In replicated, randomized experiments at Connecticut Agricultural Experiment Station, Windsor, in 1949 and 1950, solutions of 3 salts of maleic hydrazide sprayed on the upper leaves after topping suppressed sucker growth. 20 ml. per plant of 0.106 molar solutions of the K and diethanolamine salts gave excellent control and 0.053 and 0.026 molar solutions of the diethanolamine and dodecylamine salts gave satisfactory control, with no significant effects on yield, quality or burning properties. The procedures are not yet recommended for farm practice.

857. MIHAĬLOVA, P. V.

Varietal adaptation of the development of the pollen tube of makhorka to different temperatures. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82: 477-9, bibl. 10.

The lengths of the pollen tubes are recorded for a number of selections of makhorka (*Nicotiana rustica*) from two sources (north and south) after 2 and 6 hrs germination at temperatures of 20°, 30° and 40° C. on an artificially prepared medium of 0.5% agar and 10% sugar, and in the tissues of the styles. Optimal growth in the pollen from the northern region (Tomsk) occurred at about 20° C., that from the southern regions (Kirghiz S.S.R. and Kazakhstan) at about 30° C. A temperature of 40° C. was unfavourable and can thus be considered as too high for all varieties.

858. PUZZILLI, M.

Pressione osmotica nel genere *Nicotiana* in riferimento alla resistenza alla siccità. (Osmotic pressures in the genus *Nicotiana* in relation to drought resistance.)

Tabacco, 1952, 56: 110-22, bibl. 11.

In *Nicotiana* osmotic pressure is a constitutional character differing with species and variety and oscillating in each to a greater or less degree in response to environmental conditions. The significant figure in determining drought resistance is the maximum value of osmotic pressure a plant can reach in a given environment and the period for which this can be maintained without the yield being affected. *N. tabacum* has a higher maximum than the other species studied. The maxima for different varieties were: Burley—16.39 atmospheres; Virginia bright—15.22; and gigantea—14.58 (compared with less than 14 in other species). The data presented indicate the range of oscillation and hence the adaptability of *N. tabacum*.—Perugia Univ.

859. PUZZILLI, M.

Pressione osmotica nella *Nicotiana tabacum* var. Virginia Bright linea Italia (N.7) a diversi trattamenti idrici. (Osmotic pressures in *Nicotiana tabacum* var. Virginia bright, Italian strain (No. 7) under various water regimes.)

Tabacco, 1952, 56: 152-5, bibl. 8.

In pot experiments at Perugia University with seedlings of Virginia bright, Italian strain, water was applied at the rate of 1,800, 1,500, 1,200, 900 and 600 c.c. per pot daily for a month. Osmotic pressures were lowest at 1,500 c.c., rose progressively as applications fell below 1,500, and were higher at 1,800 than at 1,500 c.c. While increased pressure through shortage was a phenomenon of physical origin, that caused by excess can be considered pathological, since it was associated with a profound metabolic change. This fact is important in irrigation, which should be kept within the essential limits since any excess brings immediate loss, not only through the cost of the water but also in yield.

Composition and metabolism.

860. HUTER, R.

Facteurs qui influent sur la teneur en nicotine des feuilles de tabac. (Factors influencing the nicotine content of tobacco leaves.)

Rev. romande Agric. Vitic., 1952, 8: 36-7, bibl. 7.

The tabulated data show how the high nicotine content of Swiss-grown tobacco may be reduced by cultural methods, such as reasonable manuring (N to be applied as calcium nitrate), close spacing, light topping and early harvesting.—Mont-Calme, Lausanne.

861. MAŠKOVCEV, M. F., AND SIROTENKO, A. A.

The ability of the cells of the aerial part of the tobacco plant (*Nicotiana tabacum*) to synthesize nicotine. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 79: 487-9, bibl. 4.

Tobacco shoots grafted on to tomato roots gave rise to plants in which the nicotine content of the leaves was many times greater than that in the original shoots. It

is concluded, therefore, that the aerial parts of tobacco plants are themselves able to synthesize nicotine.

862. KUZIN, A. M., AND MERENOVA, V. I.

The biosynthesis of indicator C^{14} nicotine and the processes of transmethylation in tobacco leaves. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 85: 393-5, bibl. 6, illus.

Experiments were carried out with detached leaves from tobacco (amphidiploid) plants shaded by black paper for 48 hrs; the leaves were tested for synthesis after exposure for 24 hrs to artificial light. Details of technique and apparatus are given.

863. HOFSTRA, R., AND KEULS, M.

Onderzoek naar de opbrengst aan nicotine van *Nicotiana rustica* (L.) over de jaren 1949-1950. (An investigation on the nicotine yield of *Nicotiana rustica* in the years 1949-1950.) [English summary $\frac{1}{2}$ p.]

Meded. Inst. Vered. Tuinbouwgew. 36, 1952, pp. 44, bibl. 14.

The trials recorded show that topping and the removal of side shoots of *Nicotiana rustica* will considerably increase the content and yield of nicotine. It is an advantage to remove the side shoots three times after topping. In a late harvest a fourth removal may be desirable. On N-deficient soils the content and yield of nicotine can be increased by applying N fertilizer. Artificial fertilizers gave better results than stable manure in the wet year 1950 on sandy soils. The varieties Scharfe A, Nicotinereich D, and Nicotinereich B are most suitable for the Netherlands. A planting distance of 60×60 cm. to 50×50 cm. will probably be best, but this needs confirmation. The best time for harvesting is when the lowest leaves turn yellow and growth is arrested. In the dry summer of 1949 the content and yield of nicotine was higher than in the wet summer of 1950. It appears likely that the cultivation of tobacco in Holland for nicotine production will be economically possible.

864. WARNER, B. R.

Surface areas of tobaccos by low temperature nitrogen adsorption.

Arch. Biochem. Biophys., 1952, 40: 143-52, bibl. 11.

1. Tobacco leaf tissue is a porous material with a specific surface area ranging from 1 to 10 sq. m./g. The changes in surface area resulting from various tobacco treatments are of interest in relation to the mechanisms of the cellular expansion and contraction of the leaf tissues. 2. A large increase of surface area results from a "force aging" of tobacco. 3. Estimates of the heats of low-temperature adsorption of nitrogen on tobacco surfaces may indicate changes in the chemical composition of the leaf surfaces, caused by the specific treatment of the tobacco. 4. Tobaccos of different origins which are similar in chemical composition can differ considerably in specific surface areas and pore sizes. [Author's conclusions.]

865. HOLDEN, M.

The fractionation and enzymic breakdown of some phosphorus compounds in leaf tissue.

Biochem. J., 1952, 51: 433-42, bibl. 34.

Fractionation of the P in fibre and chloroplast fractions

of the leaves of glasshouse-grown White Burley tobacco showed about 30% of the total leaf P to occur as ribonucleic acid phosphorus, 7% as deoxyribonucleic acid phosphorus and 15% as lipid phosphorus. The distribution of the fractions in leaves of different ages was compared, and the enzymic release of P in response to several treatments was studied.—Rothamsted exp. Stat.

Cultural practice.

866. BENNETT, R. R., AND HAWKS, S. N., JR.
It pays to prime Burley tobacco.
Ext. Circ. N.C. agric. Ext. Serv. 367, 1952,
pp. 15, illus.

Higher yields can be obtained in North Carolina by priming the lower leaves once or twice before the main harvest. Only ripe, lemon-yellow leaves, 3-4 per plant, should be taken. Special care is required in curing primed tobacco and heating may be necessary.

867. VOLODARSKIĬ, N. I.
Apical chlorosis of tobacco caused by
nitrogen deficiency. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, 80:
833-6, bibl. 7, illus.

Pot experiments are described in which tobacco plants were grown in rich black soil and river sand mixed in the following proportions: 8·0/0·0, 7·5/0·5, 7·0/1·0, 6·5/1·5, 6·0/2·0, 5·5/2·5, 5/3, 4/4, 3/5, 2/6, 1/7, 0/8. Fertilizer applications consisting of superphosphate and potassium sulphate at the rate of 2 g. active agent per pot were made. Plants grew normally in the first 3 media, and in the last one (pure sand) they showed early signs of N deficiency and did not flower, nor did they exhibit apical chlorosis. The rest of the test plants grew normally at first, but later showed typical chlorotic symptoms at the apex. Applications of ammonium- or nitrate-nitrogen gave satisfactory control of the chlorosis, though often the tips of badly affected plants died off 10-15 days after treatment and vigorous healthy looking laterals grew out to take their place.

868. SCARASCIA, G.-T.
Sulla fitotossicità dell'esaclorocicloesano.
Effetti dell'isomero gamma su *Nicotiana
tabacum* e *Nicotiana rustica*. (The phyto-
toxicity of HCH. The effect of its gamma
isomer on *Nicotiana tabacum* and *N.
rustica*.)
Tobacco, 19

Gamma BHC as lindane in lanolin (5 and 10 g. per kg.) was applied as a possible polyploidizing agent to the growing points of young plants of *Nicotiana tabacum* and *N. rustica* 6-7 times at intervals of 9-10 days in June-July 1951 and caused deformation of the treated leaves.

Diseases.

869. VALLEAU, W. D., JOHNSON, E. M., AND
DIACHUN, S.
Tobacco diseases.
Bull. Ky agric. Exp. Stat. 581, 1952, pp. 62,
illus.

In this revision of *Bulletin* 437 plant-bed, root, leaf, virus, stalk and physiological diseases, lightning injury

and houseburn are discussed. Methods of prevention and control are given.

870. ROBERTS, D. A.
Independent translocation of sap-transmis-
sible viruses.
Phytopathology, 1952, 42: 381-7, bibl. 35,
illus.

Results of experiments in which 4 viruses were inoculated into tobacco and bean (*Phaseolus vulgaris*) support the hypothesis of independent translocation of sap-transmissible virus. It is assumed that the translocation mechanism normally operating in plants provides for bi-directional flow of materials in the phloem.

871. WALTERS, H. J.
Some relationships of three plant viruses to
the differential grasshopper, *Melanoplus
differentialis* (Thos.).
Phytopathology, 1952, 42: 355-62, bibl. 38,
illus.

The grasshopper, *Melanoplus differentialis*, was found to transmit tobacco mosaic, potato ringspot, and tobacco ringspot viruses from tobacco to tobacco. Primary symptoms occurred mostly adjacent to known feeding areas, though a few occurred elsewhere. Infectivity of the viruses decreased within the digestive tract of grasshoppers, though only slightly in the case of tobacco mosaic virus. Tobacco mosaic remained infective within the insects for 12 hr., potato ringspot virus for 6 hr., and tobacco ringspot virus for 4 hr.

872. BLUMER, S.
Verbreitung des Tabakmosaiks durch
Tabakstaub. (The spread of tobacco mosaic
by nicotine dusts.)
Landw. Jb. Schweiz, 1952, 66: 616-17.

In a market garden applications of tobacco dust or of nicotine-sulphur dust caused severe infection of tobacco and tomato plants with tobacco mosaic. After an exposure to 100° C. for 4 hours the tobacco dust had practically lost its infectivity. Growers are warned not to apply nicotine to solanaceous plants unless the preparations used contain heat-sterilized tobacco dust to which pure nicotine has been added later.

873. BEINHART, E. G., AND MORGAN, O. D.
Preliminary study of sterilizing tobacco
stems against mosaic diseases.
[Publ.] U.S. Dep. Agric. AIC-334, 1952,
pp. 6, bibl. 9.

The use of unsterilized tobacco stems and waste leaf scraps as fertilizer or conditioner might lead to the spread of mosaic virus in tobacco-growing areas. Virus in stems (32% moisture content) can be inactivated by exposure to a temperature of 212° F. in a saturated atmosphere for 15 minutes.—E. reg. Res. Lab., Philadelphia.

874. TERNOVSKIĬ, M. F.
The alteration in resistance to tobacco mosaic
as a result of vegetative hybridization. [Rus-
sian.]
Doklady Akad. Nauk S.S.S.R., 1951, 79:
517-20, bibl. 10.

A variety of tobacco immune to tobacco mosaic was grafted on to a susceptible variety. Seeds collected from the grafted plant were sown, and the resulting seedlings

inoculated with sap from leaves of mosaic-affected plants. Six plants showed necrotic spots and some also showed mosaic spotting. In the second generation there was segregation into immune and susceptible plants. The number of immune plants exceeded that of susceptible plants, thus suggesting that immunity is dominant to susceptibility, as is also seen in sexual hybridization. The various families, however, showed different results. Fewest immune plants appeared in the progeny of plants which showed both necrosis and mosaic mottling in the first generation, while most immune individuals appeared in the families which showed typical immunity in the first generation.

875. GIGANTE, R.

Il mascheramento del mosaico del tabacco in Provincia di Lecce. (The masking of tobacco mosaic in the Province of Lecce.) [English summary 9 lines.] *Ann. Sper. agrar.*, 1952, 6: 835-44, bibl. 6, illus.

In Lecce mosaic symptoms are masked for part of the season. Studies undertaken in 1950 and 1951 showed that this is related to high temperature (maxima 35-42° C.) and low humidity. The symptoms show either in the nursery or after planting out, become masked in mid-June or early July and reappear in September or October.

876. WEINTRAUB, M., GILPATRICK, J. D., AND WILLISON, R. S.

The effect of certain water-soluble compounds on virus infection.

Phytopathology, 1952, 42: 417-19, bibl. 15.

Of 54 compounds tested, 3 have been selected for their ability to reduce significantly the number of lesions produced by tobacco mosaic virus on *Nicotiana glutinosa*. Zinc chloride and zinc sulphate can reduce the number of lesions by nearly 100%. Zinc chloride also reduces the activity of carnation mosaic virus in *Dianthus barbatus* (Sweet William).—Dom. Lab. Plant Path., St. Catharines, Ontario.

877. MCKINNEY, H. H.

Two strains of tobacco-mosaic virus, one of which is seed-borne in an etch-immune pungent pepper.

Plant Dis. Repr., 1952, 36: 184-7, bibl. 5.

Descriptions are given of (1) a pungent pepper [*Capsicum*] immune to the tobacco-etch virus, (2) a virus that is latent in Samsun tobacco, and seed-borne in the etch-immune pungent pepper, and (3) a virus that induces mild mosaic in Samsun tobacco and is local in the etch-immune pungent pepper.

878. GUTIERREZ, M. E., AGATI, J., AND BAYUBAY, S.

Preliminary studies on the reaction of local and newly introduced varieties of tobacco to wilt and mosaic diseases.

Philipp. J. Agric., 1950 [published 1952], 15: 235-45, bibl. 11, illus.

Glasshouse and field studies were carried out at the Central Experiment Station, Manila, in 1949-50 on resistant tobacco varieties newly introduced from the United States and local varieties. The 3 introduced varieties, P.I.1801 79A (a breeding stock), P.I. 1811 448 (cigar-filler), and P.I.1813 Oxford 26 (flue-cured var-

iety), all exhibited appreciable resistance to wilt in varying degrees, while none of the 4 native cigar-filler varieties, Simmaba C, Simmaba No. 6, Vizcaya and Romero, showed comparable resistance. The newly introduced P.I.1800 Ambalema (cigar-filler) and P.I. 1816 Ky 52 (white Burley) exhibited extremely high resistance to mosaic, while Simmaba C showed slight resistance and Havana (introduced over 30 years ago) was 100% susceptible.

879. WEINTRAUB, M., AND GILPATRICK, J. D.
An inhibitor in a new host of tobacco ring spot virus.

Canad. J. Bot., 1952, 30: 549-56, bibl. 11, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric. Ottawa* 1180.

Of four seedling-clones of *Dianthus barbatus* L. tested for susceptibility to tobacco ring spot virus, two were consistently infected, one occasionally missed infection, and the fourth was not susceptible. Difficulty in transmitting tobacco ring spot virus from *D. barbatus* to tobacco was caused by an inhibitor in healthy *D. barbatus* leaves. Some of the physical characteristics of this inhibitor were studied. It had no effect on transmission of tobacco ring spot virus to *D. barbatus*, but in cucumber, *Datura stramonium*, and snapdragon, it caused either a delay of symptom expression or a lack of susceptibility in part of the inoculated plants. The inhibitor reduced infectivity of tobacco mosaic, cucumber mosaic, and tobacco etch viruses. [From authors' abstract.]

880. MOORE, E. L., LUCAS, G. B., AND CLAYTON, E. E.

Granville wilt and black shank resistant tobacco varieties.

Bull. N.C. agric. Exp. Stat. 378, 1952, pp. 19, bibl. 8, illus.

A description is given of 3 new flue-cured varieties, Dixie Bright 27, 101 and 102, and their parentage. All 3 are resistant to bacterial (Granville) wilt (*Pseudomonas solanacearum*) and the 2 latter to black shank (*Phytophthora parasitica* var. *nicotianae*). DB 27 is almost equal in yield and value to 402, a popular standard variety; DB 101 has a higher yield and value than 402; DB 102 is not high-yielding and is about equal to Oxford 26. Notes are given on handling and curing the new varieties.

881. VALLEAU, W. D.

A program for control of black shank based on a new conception of the life history of the fungus.

Bull. Ky agric. Exp. Stat. 576, 1951, pp. 24, illus.

The disease, its cause, methods of prevention of spread and means of eradication are described. Tests indicate that the time required for the disappearance of the causal fungus, *Phytophthora parasitica* var. *nicotianae*, is much shorter than generally supposed, and possibly less than a year. The disease is primarily one of small farms where tobacco land is limited. It is recommended that small farmers should grow tobacco each year on a clean piece of ground and ensure that the fungus is not introduced by running water or on tools, feet or tyres. If infection occurs, diseased plants should be removed, the infected place drenched with 1 part nabam to 400 of water and the field sown to grass in the autumn.

882. CUZIN, J., REY, P., AND SCHWARTZ, D.
Le mufle del tabacco. Studio qualitativo e quantitativo. (Tobacco moulds. Qualitative and quantitative study.)
Tabacco, 1952, 56: 163-77.

This is the first of a series of papers on a study of moulds in tobacco at all stages of manufacture—Biol. Res. Serv., Tobacco Bd Control, France.

883. GIGANTE, R.
Osservazioni sulla "farfara" del tabacco in provincia di Lecce. (Observations on a tobacco leafspot known as "farfara" in the Province of Lecce.) [English summary $\frac{3}{4}$ p.]
Ann. Sper. agrar., 1952, 6: 1351-88, bibl. 71, illus.

Two years' research showed that the tobacco leafspot condition known as "farfara", which is very common in Lecce, covers wildfire (*Pseudomonas tabaci*), and the 2 virus diseases, ring spot and streak. Notes are given on the symptoms of each disease, the characters of the causal agent, the varieties affected, means of spread, transmissibility and control. A bibliography on each disease is included (wildfire 30 references, ringspot 27 and streak 14).—Plant Path. Stat., Rome.

884. STOVER, R. H., AND KOCH, L. W.
Methyl bromide as a soil fumigant for controlling diseases and weeds in tobacco seedbeds.
Sci. Agric., 1952, 32: 411-20, bibl. 5, illus.

The efficacy of methyl bromide as a soil fumigant for controlling diseases and weeds in tobacco seedbeds was tested both in the greenhouse and outdoors with a view to its applicability in burley and dark type tobacco growing areas of Ontario and cigar and pipe tobacco areas of Quebec. These experiments showed that methyl bromide at 2 lb. per 100 cu. ft. was sufficient to destroy all soil-borne tobacco pathogens under Ontario conditions. Elimination of damping-off fungi and weeds (except clover) was obtained at dosages as low as 2 ml. per cu. ft. of soil (less than 1 lb. per 100 cu. ft.). The black rootrot fungus was partially eradicated at the latter dosage, and entirely at the 2-lb. level. Tobacco seedlings, with few exceptions, appeared to benefit from soil fumigation with methyl bromide, not only through the destruction of specific soil-borne pathogens and weed seeds, but also through a growth-stimulating effect. The latter was shown to be independent of the presence of common soil-borne pests. [Authors' summary.] [See also *H.A.*, 22: 4051.]

Nematodes.

885. GRAHAM, T. W.
Susceptibility of tobacco species to the root-knot nematode species.
Plant Dis. Repr., 1952, 36: 87-8.

This account of the susceptibility of tobacco species to 5 species of *Meloidogyne* includes tables showing the relative susceptibility of 6 species and 2 hybrids of *Nicotiana*. It is concluded that there is no indication of specialized pathogenicity that might complicate the root-knot breeding programme with tobacco. The different species of *Meloidogyne* all attack *Nicotiana tabacum*, whereas *N. megalosiphon* was highly resistant to all of them.

886. CLARK, F., AND MYERS, J. M.
Fumigation and equipment for nematode control in soils for flue-cured tobacco.
Circ. Fla. agric. Exp. Stat. S-27, 1951, pp. 11, illus. [received Oct. 1952].

DD and ethylene dibromide (EDB) are applied 6-9 inches deep, 3-4 weeks before transplanting, at 8-75 and 6-5 gal./acre respectively for 48-inch rows and 10 and 7-5 gal. for 42-inch rows. A simple gravity applicator which can be assembled by a farmer on a 2-row tractor cultivator frame and its manipulation are described and illustrated. Notes are given on fertilization after fumigation. In tests yields per acre were 835 lb. with DD and 928 with EDB compared with 392 for the control; heavy and medium root-knot indices were 34% after DD treatment and 28% after EDB compared with 96% for the control.

Curing.

887. MATTHEWS, E. M., AND BAKER, V. H.
A forced-ventilation tobacco curing system.
Agric. Engng, St. Joseph, Mich., 1952, 33: 429-30, illus.

A description and diagram are given of a forced ventilation tobacco curing chamber installed in a wood-frame barn. An electric fan blows air into the heating jacket around the flue and, as long as the humidity in the curing chamber is at the correct level, the recirculation system moves the air through the heating jacket orifices, up through the tobacco, down through the recirculation duct and back into the heating jacket. When the air humidity becomes too high the damper motor opens the ventilators and fresh air is drawn in at the bottom and moist air expelled at the top until the latter is exhausted, when the ventilators close and the recirculation system comes into operation again. Curing by this system proved cheaper than by normal oil- and coal-fired furnaces.

888. TIRELLI, M.
Attuali conoscenze sulla disinfezione dei tabacchi in magazzino. (Present knowledge on the disinfection of tobacco in storage.)
Tabacco, 1952, 56: 178-89, bibl. 13.

This review article gives the following as the best method of controlling insect attacks on tobacco in storage: (1) manufactured packaged tobacco—fumigation with hydrocyanic acid, methyl bromide or ethylene oxide under pressure in sealed chambers, or dry refrigeration; (2) unmanufactured tobacco in bales, casks, etc.—fumigation with hydrocyanic acid under pressure, or at a high concentration at as high a temperature as possible in a hermetically sealed warehouse; (3) manufactured or unmanufactured tobacco stored loose—fumigation in a hermetically sealed warehouse. In addition periodical treatment with DDT or pyrethrum insecticides is useful against *Lasioderma serricorne*.

Noted.

889. ANON.
a La culture du tabac en France et dans l'Union Française. (Tobacco culture in France and the French Union.)
Rev. int. Tabacs, 1951, 26: 232-4, 240, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 112.

- b BENNETT, R. R., AND OTHERS.
Tobacco plant production guide (flue-cured).
Ext. Circ. N.C. agric. Ext. Serv. 363, 1951,
pp. 14 [received Oct. 1952].
Nursery practice including control of insects
and blue mould.
- c BENNETT, R. R., AND OTHERS.
Burley tobacco plant production guide.
Ext. Circ. N.C. agric. Ext. Serv. 364, 1951,
pp. 16 [received Oct. 1952].
Nursery practice including control of
insects, blue mould and wildfire.
- d CORTES MUÑOZ, V.
Determinación espectrofotométrica del calcio
en tabaco. (The spectrophotometric
determination of calcium in tobacco.)
[English summary 7 lines.]
Bol. Inst. Invest. agron. Madrid, 1951, 9:
371-401, bibl. 4, illus.
- e GRINDROD, J.
Tobacco growing and processing.
World Crops, 1952, 4: 229-31, illus.
Notes on methods used in the main produc-
ing countries.
- f GRINDROD, J.
Research in the field of tobacco cultivation
and processing.
World Crops, 1952, 4: 242-3.
Based on reports to the World Tobacco
Congress, Amsterdam, 1951.
- g McDONALD, E. J.
Tobacco growing in south-western Queens-
land.
Qd agric. J., 1952, 75: 63-84, illus.
- h SMITH, W. A.
Tobacco pests in Queensland.
Qd agric. J., 1952, 75: 85-104, illus.
- i VELARD, E.
Le tabac à Madagascar. (Tobacco culture
in Madagascar.)
Rev. int. Tabacs, 1952, 27: 8, from abstr. in
DocumBl. trop. Prod. Amst., 1952, 7: 216.
- j VICKERY, H. B., HARGREAVES, C. A. II,
AND NOLAN, L. S.
The metabolism of the organic acids of
tobacco leaves. VI. Effect of culture of
excised leaves in solutions of dl-malate.
J. biol. Chem., 1952, 197: 133-9, bibl. 8.
- k VITART, J.
Le tabac en Afrique occidentale française.
(Tobacco in French West Africa.)
Agron. trop., 1952, 7: 343-54, illus.
With suggestions for expanding production.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary and spice plants.

(See also 1373, 1376.)

890. BREEN, H.
Kardamon, gember en curcuma. (Carda-
mom, ginger and curcuma.)
Naarden Nieuws, 1952, 25: 2, from abstr. in
DocumBl. trop. Prod. Amst., 1952, 7: 152.

Some notes and pre-war production figures are given on
cardamoms (*Elettaria*, *Amomum* and *Aframomum*
species), ginger (*Zingiber officinale*) and curcuma
(*Curcuma domestica*), spices which also produce useful
essential oils.

891. OREGON STATE COLLEGE.
Oregon's specialty field and drug crops,
1915-1948.
Ext. Bull. Ore. St. Coll. 696, 1949, pp. 14
[received 1952].

Among the crops mentioned are hops, of which cul-
tivation is decreasing owing partly to downy mildew and
low yields, and peppermint, the cultivation of which is
steadily increasing.

892. ČIKALOV, P. M.
Improving the quality of coriander seed.
[Russian.]
Agrobiologija, 1950, No. 4, pp. 119-25.

Data are presented showing that coriander seed (*Cori-
andrum sativum*) sun-treated for 2 days produced more
vigorous plants, giving higher yields and better quality

seed, than plants grown from untreated seed. For the
Krasnodar and Voronež regions, where coriander seed
production is carried out on a large scale, the recom-
mendation is made to sun-treat the seed immediately
after harvest and repeat the operation in the spring
before sowing.

893. SCARAMUZZI, F.
Note genetiche e pratiche per la selezione
del finocchio dolce. (Genetical and practical
notes on the selection of sweet fennel.)
Riv. Ortoflorofruttic. ital., 1952, 36: 113-21,
bibl. 12, illus.

The author considers that more rapid and certain
improvement can be achieved by a genealogical selec-
tion of the better strains, based on a study of the
individual offspring of each self-fertilized plant, than by
mass selection as practised at present.—Florence Univ.

894. DAVID, P. A.
The black pepper culture in the College of
Agriculture at Los Banos.
Philipp. Agric., 1951, 35: 130-6, bibl. 3, illus.
[received Sept. 1952].

The method of growing *Piper nigrum* var. *trioicum* at the
Philippines College of Agriculture is briefly described.
Propagation was by cuttings 45-60 cm. long, with not
less than 7 joints, from the ends of vigorous vines in the
rainy months, and from seed. Two crops a year were
obtained from 3 years after planting. *Gliricidia sepium*

and *Leucaena glauca* were suitable supports. *Cyrtanthacris varia* and *Aspidiotus destructor*, and a bird, *Stachyris nigrocapitata*, were major pests. The minimum yield per vine in the first crop year was 20-40 g. peppercorns.

895. BRUYN, B. A.

Peper, het voornaamste product van de landbouwende bevolking van Bangka. (Pepper, the chief product of the agricultural population on Bangka.) *Erts, Maandbl. Billiton Bedr.*, 1952, 4: 18-22, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 152.

Historical notes are given on the importance of pepper production on Bangka, with a survey of the pre- and post-war position of the industry, its rehabilitation, competition with India and future prospects.

896. ANON.

India's trade in black pepper.

Indian Trade J., 1952, 181: 210-11, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 252.

Export figures and prices of black pepper are given with notes on culture, varieties and production.

897. LEMERLE, G.

La vanille, produit naturel et richesse nationale, est-elle appelée à disparaître devant le produit chimique? (Vanilla, a natural product and national resource, is threatened by the synthetic product.) *Marchés colon. Monde*, 1951, 7: 3270-1, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 87.

An account is given of the importance of vanilla culture and trade in Madagascar. The industry is increasingly threatened by the synthetic product.

898. STEHLÉ, H.

Le vanillier et sa culture. (Vanilla and its cultivation.) *Fruits d'Outre Mer*, 1952, 7: 50-6, 99-112, 253-60, bibl. 94, illus.

The more important subjects covered in this comprehensive review article are: description (with key) of the 3 cultivated species (*Vanilla planifolia*, *V. tahitiensis* and *V. pomona*); natural habitat and areas in which cultivated; ecology; establishment of plantations including slope, microclimate, choice and preparation of soil, suitable species as live supports, shade and shade trees, terracing, spacing at 1.5-2.4 m. apart in lines 3 m. apart; propagation by cuttings about 1 m. long containing 10-12 nodes (or a minimum of 2-4), about 1 cm. in diameter and preferably with a terminal bud; maintenance including pruning, mulching and 2nd and 3rd year operations; filling of blanks by layering from adjacent vines; manuring (heavy applications of N and K needed in Puerto Rico); pollination; harvesting; physiological diseases (scorching, fluting, scab); fungal diseases, including fusarium root rot, 3 stem diseases, leaf mildew (*Phytophthora jatrophae*?), blanc du vanillier, anthracnose (*Calospora vanillae*), blast disease of flowers and fruits. Mulching (preferably 30-35 cm. thick in the dry season), shade at $\frac{1}{2}$ - $\frac{3}{4}$, and artificial pollination (5-6 flowers per inflorescence) are important.

Drug plants.

(See also 956, 957, 969e, g, o, u, y, 970e.)

899. ROIG Y MESA, J. T.

Algunas propiedades medicinales de plantas sudamericanas que se conocen poco en la América del Sur. (Some medicinal properties, little known in South America, of South American plants.) [English abstract 4 lines.] *Lilloa*, 1949, 18: 191-201 [received 1952].

Some drug plants of Cuba and South America are listed according to their medicinal properties, and notes are given on their distribution and uses.

900. WATANABE, S.

Silvicultural studies on kusu (*Cinnamomum camphora* Sieb.). On the heterospermy of seeds.

Bull. Tokyo Univ. For., 1951, 39: 13-20, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1950/51, No. 1, pp. 67-8 [received Aug. 1952].

Two types of camphor seed may be recognized, the ordinary type and a smaller, darker, hard type. Seeds of the hard type did not germinate so well as the ordinary seeds unless treated with hot water, a treatment which damaged seeds of the ordinary type. After 6 months' storage germination percentages of ordinary and hard seeds were 22 and 2 respectively.

901. ANON.

Kashmir, a rich source of atropine.

Kashmir, 1951, 1: 469, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 54.

Experiments have shown that the prospects for atropine production from *Physochlaina praealta* in Kashmir are promising.

902. ANON.

Cortisone from sisal waste.

Chemurg. Dig., 1952, 11(1): 15, from abstr. in *Econ. Bot.*, 1952, 6: 245.

Hecogenin, a steroidal sapogenin in sisal leaves, is being investigated in England and East Africa as a basis for the partial synthesis of cortisone.

903. WALASZEK, E. J., KELSEY, F. E., AND GEILING, E. M. K.

Biosynthesis and isolation of radioactive colchicine.

Science, 1952, 116: 225-7, bibl. 8.

Methods are described whereby C^{14} was incorporated into all constituents of *Colchicum autumnale* plants, crude alkaloids were isolated from the plants, radioactive colchicine was separated chromatographically from 5 other related alkaloids found to be present, and the degree of purity of the final product was determined.

904. WEIZMANN, A.

Isolation of colchicine from *Colchicum hierosolymitanum* Feinbr.

Bull. Res. Coun. Israel, 1952, 2 (1): 21-6, bibl. 27.

A method of extracting colchicine from the abundant native species *Colchicum hierosolymitanum* is described. Air-dried corms harvested in November and June contained 0.101 to 0.093% colchicine (=0.022 and 0.016% calculated on fresh weight). Non-dried mater-

ial yielded 0.018% of fresh weight. It appears, therefore, that prolonged drying does not result in any decomposition of the alkaloid, and also that seasonal variation in the colchicine content of this variety is slight.

905. PEREIRA, A., JR.

Recherches pharmacognosiques sur les semences de quelques espèces du genre *Coronilla*. (Pharmacological work on the seeds of some species of *Coronilla*.) *Portugal. Acta biol., Ser. A*, 1949, 2: 263-323, bibl. 90, illus. [received 1951].

The seeds of *Coronilla glauca* contain at least 4 different cardiotonic glucosides, including one which hydrolyses to give a furano-coumarin identical with psoralin from *Psoralea corylifolia* and ficusin from *Ficus carica*. Seeds of 14 other species of *Coronilla* contained cardiotonic glucosides, 9 of them also producing furano-coumarin in considerable quantities. The morphological, histological and microchemical characters of the seeds of a large number of species are compared. Drawings of the seeds of the different species and a table showing microchemical reactions are presented as aids to identification.

906. SESSELER, W. M., AND SPOON, W.

Over het gebruik van wilde salie op de Benedenwindse Eilanden. (On the use of *Croton flavens* in the Netherlands Leeward Islands.) [English summary $\frac{1}{2}$ p.] Reprinted from *West-Indische Gids*, 1952, 33 (1/2): 49-52, bibl. 4, as *Ber. afd. trop. Prod., kon. Inst. Trop., Amsterdam* 237.

An analytical study was made of the leaves and stems of *Croton flavens*, a shrub indigenous in the Dutch Leeward Islands, where it is used by the natives for medicinal purposes. It is also said to have a repellent action against insects. Steam distillation yielded an essential oil (0.25-0.3%) with a density ($15^{\circ}/15^{\circ}$) of 1.0073 and refractive index (20° C.) of 1.4492-1.4534. The odour was unpleasant at first but became aromatic. The ash contained 15% K.

907. HÖHN, K.

Nachreifstudien an *Datura*-Samen. (After-ripening of *Datura* seeds.) *Planta*, 1952, 40: 407-18, bibl. 13.

After separation from the parent plant ripe seeds of *Datura stramonium* require an after-ripening period of 3½-4 weeks. Thereafter the germination capacity is subject to an annual rhythm which shows an increase in activity in December. Only extracts of *Datura* seeds that were at least 3½ weeks old reduced the rate of germination. The inhibiting effect of the extracts increased with age of seed until an optimum was reached that coincided with optimum germination. The seeds retained the strong action of their extracts and good germination capacity for at least a year. The inhibiting agent in the seeds is not HCN and its action is not confined to seedlings of the genus *Datura*. It is destroyed at 70° C.—Mainz University.

908. GUPTA, M.

Ipecacuanha. Its cultivation in India in the last decade. *Sci. and Cult.*, 1952, 18: 137-41, bibl. 8, illus.

Cephaelis ipecacuanha grows successfully in India, but, as is shown in this historical account, a marked expansion of cultivation is needed if supply is to satisfy local demand. Details are tabulated of yields of roots and of emetine and other alkaloids obtained from plants, 1 to 5 years old, grown at Mungpoo.

909. NEELAKANTAN, S., AND SESHADRI, T. R.

Chemical investigation of Indian lichens. *J. sci. industr. Res., India*, 1952, 11A: 338-40, bibl. 18.

Some lichens are of use for the preparation of drugs, notably antibiotics, dyes, perfumes and condiments. A brief account is given of some of the more important chemical components found in Indian lichens belonging to the following genera: *Roccella*, *Parmelia*, *Ramalina*, *Teloschistes*, *Caloplaca* and *Usnea*.—Dep. Chem. Univ. Delhi.

910. HATANO, K.

On the germination of hazenoki (*Rhus succedanea* L.) seeds treated with sulphuric acid. I and II.

J. Jap. For. Soc., 1950, 32: 185-8, and 1951, 33: 218-21, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1950/51, No. 1, p. 61 [received Aug. 1952].

The hard endocarps of seeds of *Rhus succedanea* are destroyed by concentrated H_2SO_4 and treated seeds absorb more water than untreated. The best germination occurred after soaking for 1 to 4 hrs.

911. FOPPIANO, R., SALMON, M. R., AND BYWATER, W. G.

The glycosides of the seeds of *Strophanthus schuchardti* Pax. *J. Amer. chem. Soc.*, 1952, 74: 4537-8, bibl. 11.

The seeds of *Strophanthus schuchardti* were found to contain sarveroside, intermedioside, panstroside and sarverogenin.

Essential oils.

(See also 968, 969a, b, d, p, s, w, 1190.)

912. RIEDINGER, M.

Les huiles essentielles. (Essential oils.) *Marchés colon. Monde*, 1951, 7: 2969, 2971, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 217.

A short review of the production of essential oils, including geranium, vetiver, lalang, mint and patchouli oils.

913. ANON.

Production of peppermint oil.

Perfum. essent. Oil Rec., 1951, 42: 408-9, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 114.

Information on areas of cultivation and production of peppermint oil in America and India.

914. ELLIOTT, I. L., AND ADAM, G.

Peppermint oil production trials.

N.Z. J. Agric., 1952, 85: 240, illus.

Peppermint oil yield from a trial plot on peat soil was about 50 lb. per acre. The prospects of establishing the industry in New Zealand appear to be promising.—Rukuhia Soil Research Station.

915. HEGNAUER, R.

Botanische beschouwingen over muntsoorten. (Botanical considerations on mint species.)

Herba, 1952, 11: 1-8, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 181.

The taxonomy, cytology and distribution of the genus *Mentha* are dealt with, and the characteristics and morphological variability of the varieties are described.

916. NAVES, Y. R.

Rosewood oils from Amazonas (Brazil).

Perfum. essent. Oil Rec., 1952, 43: 4-6, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 152.

Results of some analyses of rosewood oil samples from Brazil are given, with special reference to the d-linalol content.

917. OCCHIONI, P., AND DE SOUZA, A. H.

"Pau rosa" brasileiro e seu óleo essencial. (Brazilian rosewood and its essential oil.) [English abstract $\frac{1}{2}$ p.]

Lilloa, 1948, 16: 213-42, bibl. 41, illus. [received 1952].

The Lauraceae of the Amazon basin that produce essential oil of rosewood are *Aniba rosaeodora* Ducke and *A. duckei* Kosterm. In French Guiana *Licaria guianensis* (female rosewood) also produces an essential oil, but this is laevo-rotary whereas the oil from *A. rosaeodora* is dextro-rotary. The distinguishing characters of the 2 *Aniba* species are given and a histological and anatomical study of *A. rosaeodora* is reported. Work on the determination of linalol, which constitutes about 91% of the essence, is reviewed.

918. GREBINSKIĬ, S. O., AND LJUKOVA, L. A.

The effect of oxidizing agents on the formation and properties of essential oil in plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 84: 773-5.

Analyses for yields of essential oils were made on plants of sage, mint, lavender, hyssop, and fruits of coriander, sprayed with manganese sulphate or, in some cases, with iron sulphate or potassium permanganate. The treatments increased the yields and modified the odour of the oils. The character of the oils was altered also by spraying the plants with weak solutions of α -naphthaleneacetic acid or heteroauxin (0.01%) or copper sulphate (0.0025%), but then the yield was reduced.

Fibres.

(See also 902, 969h, k, t, 1375.)

919. ALLISON, R. V., AND OTHERS.

Fiber crop investigations.

A.R. Fla agric. Exp. Stat. 1951, p. 192.

Tests at the Everglades Station indicate that certain varieties of ramie from Java and Brazil and a selection made at the station gave higher yields than the type grown commercially in Florida. The need for K, P and Zn applications for maximum ramie yields is stressed. *Sansevieria trifasciata* showed considerably less cold injury than *S. guineensis*. Weedy *sansevieria* plots were more severely injured by frost than clean cultivated plots; chemical weed control appeared very promising.

The optimum period for planting kenaf for fibre appeared to be May and June, and for seed, July and August. In preliminary tests the highest yield of fibre was obtained on peat soil, but sandy soil appeared more suitable for seed production.

920. NICHOLS, A. F.

Trials at Thika high level sisal research station.

A.R. Kenya Dep. Agric., 1950, Vol. II, 1952, pp. 179-86.

Cutting trial. A 9-year replicated experiment designed to investigate the effect of cutting sisal planted at 12 by 3 ft. (1,210/acre) heavily (leaving 12 leaves) and lightly (leaving 36 leaves) at 6-, 12- and 18-month intervals and beginning at 3 $\frac{1}{2}$, 4 and 4 $\frac{1}{2}$ years old showed that an early cut is desirable and a light cut essential to increase yields. *Spacing trial.* In a 9-year randomized trial, designed to investigate the effect of various spacings ranging from 726 to 2,178 per acre on yield, the first cut was made at 3 $\frac{1}{2}$ years old and was followed by annual cuts. With one exception yields increased as number of plants per acre increased. *Nursery mulching trial.* There was a very marked response to a mulch of fresh sisal waste from wet decortication.

921. ANON.

Modern methods of sisal growing.

East Africa and Rhodesia, 1951, 28: 262, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 84.

Soil studies, weed control and control of the sisal weevil in Tanganyika are dealt with, together with the prices and market requirements of sisal.

922. CRETENET, S.

Le sisal en Anjouan. (Sisal culture in Anjouan [Madagascar].)

Coton Fibr. trop., 1951, 6: 183-7, illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 111.

Soils and climate, cultural practices and pests and diseases are dealt with.

923. ONOFRY, A.

El cultivo industrial de *Arundo donax* en Ramallo (Argentina). (The cultivation of *Arundo donax* for industrial purposes in Ramallo, Argentina.)

Rev. argent. Agron. B. Aires, 1952, 19: 133-9, bibl. 1, illus.

The giant reed, *Arundo donax*, was grown by a commercial firm in Argentina for the manufacture of hardboard, and their methods are here described. The rhizomes were planted in furrows 4 m. apart and allowed to spread to form blocks 2 m. wide. This allowed space for mechanical harvesting and for periodic rejuvenation of the plantation by grubbing the old rhizomes and cropping the inter-rows. Preplanting cultivation to a depth of 60 cm. is desirable. An ample supply of N is necessary and during the first few years a leguminous green manure crop should be grown in the inter-rows. Drought or spring frosts can seriously retard the growth of young plantations. Yields are from 10 to 20 tons dry cane per ha., depending on the fertility of the soil.

924. MARTINS, A. Q.
Contribuição para o conhecimento de *Hedychium coronarium* Koen. (Lírio do brejo.) (A contribution to the knowledge of *Hedychium coronarium* Koen). [English summary 5 lines.]
Lilloa, 1948, 16: 242-9, bibl. 10, illus.
[received 1952].

Hedychium coronarium was introduced to Brazil as an ornamental plant and has now spread over vast areas. The vigorous shoots, which may be 2 m. high, contain fibres that are used in paper manufacture. The abundant tubers contain a high proportion of starch that closely resembles arrowroot. A study on the anatomy of the rhizomes and the structure of the starch is reported.

925. MEHRHOF, N. R., DAVIS, G. K., AND DRIGGERS, J. C.
Ramie meal in chick rations.
Circ. Fla agric. Exp. Stats S-20, 1950, pp. 5
[received Oct. 1952].

Ramie tops and leaves left after decortication of the fibre were turned into a meal by dehydration and grinding in a hammer-mill. Feeding trials on chicks showed the meal to compare favourably with alfalfa leaf meal.

926. SCHWARTZ, W.
Untersuchungen über die Gewinnung der Faser von *Boehmeria nivea* Hook et Arn. (Investigations on the processing of ramie fibre.)
Angew. Bot., 1952, 26: 138-46, bibl. 6.

The following method was worked out in the laboratory: (1) Mechanical decortication of freshly harvested or defoliated, dry shoots. (2) Hot water treatment at 28-35° C. for 48-60 hours with inoculation of bacteria from potato cultures fermenting the pectin. (3) Washing of the treated cortex ribbons. (4) Continuous processing by degumming, bleaching, etc., on transport to the spinning mill after drying. In cultural trials in the upper Rhine valley the plants were found to differ in respect of hardiness, vigour and quality of fibre, which suggests the desirability of selection.

927. TALUKDAR, S.
Photoperiodic behaviour of *Hibiscus sabdariffa*, L.N.P.5.
Nature, 1952, 170: 458-9, bibl. 3.

A 10-hour day reduced the time taken for the initiation of the first visible flower buds from 122 days (untreated = 12-13½ hours) to 69-25 days. A 14- and 16-hour treatment caused a delay of 19 and 32 days respectively.—Presidency College, Calcutta.

928. UMALI, D. L., AND VALDEZ, C. G.
The fertility relationship of abacá with pacol and canton.
Philipp. Agric., 1951, 35: 171-85, illus.
[received Nov. 1952].

In experiments conducted in 1949-51, *Musa cantoni* (canton) was found to be incompatible with the other 2 species, but reciprocal crosses between *M. textilis* (abacá or manila hemp) and *M. errans* (pacol) produced some viable hybrid seeds. *M. errans* and *M. cantoni* are both immune to bunchy top and mosaic diseases.

929. FEUELL, A. J., AND JARMAN, C. G.
Pavonia urens fibre from Uganda.
Colon. Plant Anim. Prod., 1951, 2: 306-9, bibl. 7, illus.

A botanical description of this malvaceous shrub is given from the literature. A sample of its fibre from Uganda compared unfavourably in strength and fineness with jute and probably more closely resembles the fibre of *Hibiscus cannabinus*.

930. ASAI, T., AND NAKAMURA, S.
Microbial degumming of fibres. Part IV. Retting of Manila hemp by mold and wood destroying fungi.
ASAI, T., AND NAKANISHI, T.
Idem. Part V. Retting of ramie fibre by molds.
ASAI, T., SANO, S., AND INOUE, G.
Idem. Part VI. Retting of mulberry fibre by *Aspergillus niger*.
ASAI, T., AND SAITO, H.
Idem. Part VII. Retting of ramie-fibre in submerged enzyme produced by *Aspergillus niger*.
J. agric. chem. Soc. Japan, 1950, 23: 349-, 354-, 308-, and 404-, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1950/51, No. 1, pp. 39-40 [received Aug. 1952].

Conditions under which Manila hemp, ramie and mulberry fibres were successfully retted experimentally with the aid of strains of *Aspergillus niger* or *A. varians* are described.

Hops.

(See also 900, 969i, m, 1402.)

931. SMILEY, N. B.
Brewing trials of new variety hops—1949 crop.

J. Inst. Brew., 1952, 58: 183-4.
FF21 (Early Choice) DD12 and WFG19 are considered to be suitable for ales and stout as Golding replacements and 170A (Pride of Kent) for ales only.

932. DE ESCAURIAZA, R., AND PEREZ VALERA, F.
Contribución al estudio del valor cervecero de los lúpulos cultivados en España. (Contribution to the study of the brewing value of the hops cultivated in Spain.) [English summary ½ p.]
Bol. Inst. Invest. agron. Madrid, 1951, 9: 415-28, illus.

This paper contains a short history of hop cultivation in Spain, a list of the varieties grown and sections on the botany and chemistry of the hop. From a chemical analysis of the cones of a number of varieties it is concluded that those with the best brewing qualities are Golding and Brewer's Gold.

933. NALIVAİKO, JU. S.
Increasing the bitter substances in hops. [Russian.]
Doklady vsesojuz. Akad. sel'sk. Nauk, 1952, 17(7): 25-8, bibl. 6.

Trials conducted at the Žitomir Hop Research Station, Ukraine, have shown that a 50% increase in normal fertilizer application increased not only the yields of cones but also the quantity of their bitter principles.

A higher percentage of bitter substances was obtained in cones grown on plants trained to 4 vines on 2 strings than to 2 vines on 1 string. The greatest accumulation of bitter principles was found at the time the cones reached full maturity, and their immediate picking is recommended. Meteorological conditions prevailing during the growing season have a strong influence on the quality of hops, thus in 1949 (452.9 mm. rain) cones of the variety Clone No. 18 contained 21.13% bitter substances, while in 1951 (208.4 mm. rain) it was only 11.81%. The new varieties, Clones No. 18, 16 and 34 introduced by the Research Station and tested at various collective farms gave higher yields of better quality hops than the standard local varieties. The bitter substance content of hops was found to be generally higher in regions of ample precipitation, and lower in the dry, eastern parts of Russia.

934. BISHOP, L. R.

The resins of hops as antibiotics.

Symposia of the Society for Experimental Biology. III. Selective toxicity and antibiotics, 1949, pp. 101-4, bibl. 19 [received 1952].

Attention is drawn to the interesting antibiotic properties of lupulon and humulon, the acids isolated from the soft resins of hops.

935. VERZELE, M., AND GOVAERT, F.

Humulinone: its alleged occurrence in hops.

J. chem. Soc. Lond., 1952, pp. 3313-14, bibl. 2.

Humulinone was shown to be an artefact produced by oxidation of humulone after extraction from the hops.—University of Ghent, Belgium.

936. HARRIS, G., AND POLLOCK, J. R. A.

Pipecolic acid, a widely occurring amino-acid.

Chem. Ind. Lond., 1952, No. 38, p. 931, bibl. 8.

Pipecolic acid has been detected in hops and barley. As its presence has also been reported elsewhere in very diverse species it is concluded that it is widespread in nature and fulfils an essential metabolic function in plants.

937. WATSON, G. A.

Variation in mineral content of the hop leaf.

A.R. Wye Coll. Dep. Hop Res. 1951, 1952, pp. 29-40.

The problems of localized differences in the plant and of variations within and between seasons are important in foliar diagnosis of nutritional status. These were studied in experiments in 1950 and 1951. The levels of Ca, Mg and Mn in the leaf increased during the growing season and were direct functions of the maturity of the particular leaf sampled. The % contents of N, P and K decreased during the growing season and were different in leaves of different ages. The eventual aim of this work is to enable a plant's nutritional condition to be assessed by simple chemical analysis of the leaf alone. Recommendations are made on sampling procedure.

938. THOMPSON, F. C., CRIPPS, E. G., AND WATSON, G. A.

The effect of soil acidity on the growth of hops. I.

A.R. Wye Coll. Dep. Hop Res. 1951, 1952, pp. 24-8, bibl. 2.

A randomized experiment is described which was laid down on a light, acid soil, to study the effect of soil acidity on the growth of hops of the Fuggles variety. The treatments applied were calcium as calcium sulphate (gypsum); magnesium as magnesium sulphate (Epsom Salts); lime; lime plus magnesium as sulphate. The results of field observations, leaf analyses and soil analyses over a three-year period are discussed. Applied treatments had statistically significant effects on the soil and on nutrient uptake by the plants, but were not reflected in the growth made by the plants or by the development of mineral deficiencies or toxicities. The conclusion is drawn that under certain soil conditions hops can make good growth at much lower pH levels than had previously been thought to be the case. [Authors' summary.]

939. THOMPSON, F. C.

Some observations on the nutrition and manuring of the hop plant in the light of recent work at Wye.

A.R. Wye Coll. Dep. Hop Res. 1951, 1952, pp. 18-23, bibl. 2.

The major requirements of hops are N, P and K, with Ca where necessary to bring the soil to a suitable pH. **Nitrogen.** Hops need abundant N, the actual amount depending on the season. The main emphasis should be placed on applications of quick-acting top dressings throughout the growing season, but a basic reserve of more slowly available N is also desirable to supply humus and help in maintaining soil structure and should be given as a winter dressing. **Phosphate.** Evidence suggests that young plants being established on soils low in available phosphate respond well to relatively heavy dressings of phosphate, but the established plants can grow satisfactorily with much reduced dressings even on soils with low phosphate availability, provided the root range is good. The demand is at the beginning of the growing season. **Potassium.** K deficiency is more widespread than had been realized and may be due either to low K content in the soil or to the 3 associated factors, K fixation, low K in subsoil, and restricted root range. Where soil conditions restrict nutrient uptake the first deficiency to show is that of K, probably due to the high Ca content of the hop. **Acidity.** It has been thought that hops do best on soils of pH about 6.5-7, but recent evidence throws doubt on this, since under certain conditions hops grow well at a pH of 5.5. **Magnesium.** Mg deficiency only affects the yield if sufficiently severe to cause marked defoliation. **Minor elements.** Mn, Zn and true Fe deficiencies have not yet been observed under field conditions. A possible case of B deficiency is being investigated.

940. SUHOV, K. S.

New investigations on plant virus diseases in Czechoslovakia. [Russian.]

Priroda, 1952, No. 5, pp. 82-9, illus.

The symptoms of 5 virus diseases of hop are noted and illustrated.

941. GIBB, J. A. C., AND CHATER, G. P.

A survey of hop-picking machines, 1951.

A.R. Wye Coll. Dep. Hop Res. 1951, 1952, pp. 42-68.

A description is given of the 2 McConnel-Hinds machines (Plucker Bank and Flying Finger), the 2 Bruff machines ("300" and "200") and the experimental

Harvester machine, all of which are stationary, and of Strettle and Burr mobile prototype, and their methods of operation. The products of the different machines were compared as a result of the survey and analytical figures are reproduced. Results are discussed and conclusions drawn. Samples from the Plucker Bank machine usually appeared more whole than those from others. [See also *H.A.*, 22: 4109.]

942. BROWN, J. F.

Hop picking by machine in England and America.

J. Inst. Brew., 1952, 58: 331-6.

An account is given of the development of hop-picking machines, from their first successful use in California in 1905 to the present day. The principles involved in mechanical picking are described, the English machines being mainly of the stationary vertical type. In consequence of varietal characteristics, the traditional English hops (Goldings, Fuggles) present greater difficulties for mechanical picking than do American varieties; in general, "hard" hops pick more easily than those with "soft" cones, and seedless hops more easily than seeded types. The influence of climate is important, and careful design and running of machines is of first importance if damage is to be avoided and if a clean sample, reasonably free from leaf and strig, is to be produced. Attempts must be made to minimize the present losses of lupulin. Greatly increased mechanical picking is to be expected in the near future, and care must be taken to see that a falsely high valuation is not placed on the samples so obtained. [Author's summary.]

943. BULLOCK, E. J.

The mechanization of hop-picking in England.

Fm Mech., 1952, 3: 221-4, illus.

Mechanical methods and recent progress by engineers are reviewed. Traditional methods of management are sometimes a deterrent to the greater adoption of mechanization.

Insecticidal plants.

(See also 969f, 1290.)

944. GADDUM, E. W.

Pyrethrum stripping trial.

A.R. Kenya Dep. Agric. 1950, Vol. II, 1952, pp. 174-5.

The object was to find out the saving of labour that could be effected by stripping (picking all open flowers irrespective of stage of maturity) at 2-, 4- and 6-week intervals compared with normal selective picking at 2-week intervals. During the first half of the season the stripping treatments produced slightly more pyrethrins per acre, but over the whole the selectively picked control yielded the greatest weight. The saving of labour costs by stripping was small compared with the value of the pyrethrins lost. [See also *H.A.*, 22: 3212.]

Rubber plants.

(See also 969 I, 1306-1319.)

945. HORCHE, T., AND DE RAFOLS, W.

Ensayos de cultivo de la planta cauchifera *T. kok-saghyz* Rodin. (Experimental growing of the rubber plant, *Taraxacum kok-saghyz*.) [English summary 6 lines.] *Bol. Inst. Invest. agron. Madrid*, 1952, 12: 289-307, bibl. 6.

Small experimental plots were laid down in various parts of León Province, northwest Spain, in 1950 and the satisfactory percentage rubber obtained (up to 10% dry weight) showed that the prevailing soil and climatic conditions suit the crop. Germination began 8 days after sowing and was complete in 15 days. Planting out took place in early April, 7 weeks after sowing, and samples for analysis were collected in June and October. Superphosphate increased yields. Plots exposed to greater temperature ranges and in general those not protected from cold winds gave the higher ratios of rubber to dry weight, although their vegetative development was slightly less than that of other plots.

946. BUGAĬ, S.

Summer sowing of kok-saghyz. [Russian.]

Kolhoz. Proizv., 1952, No. 6, p. 60.

Summer sown kok-saghyz is stated to develop faster and produces higher yields of both roots and seeds than plants sown in the spring or autumn. July is the best time for sowing stratified seed in well prepared soil at a spacing of 45 × 45 cm.

947. OZEROV, G. V., AND OZEROVA, M. A.

A new pre-sowing treatment of kok-saghyz seed. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 83: 311-14, bibl. 4, illus.

In trials at Minsk, various chemical treatments of different concentrations were applied to unstratified kok-saghyz seed to improve germination. Soaking the seed for 2-4 days in 0.25 to 0.5% potassium hydroxide or potassium chloride was found most satisfactory. The treated seed was rinsed in clean water, slightly dried and sown in well prepared beds, where it germinated quickly and evenly.

948. PINEVIČ, L. M.

The effect of different sources of nitrogen nutrition on the accumulation of rubber in kok-saghyz. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82: 485-7, bibl. 12.

The rubber content of kok-saghyz was higher in plants receiving urea as a source of nitrogen than in those receiving ammonium sulphate or sodium nitrate.

949. NOVIKOV, V. A., AND ŠUSTOVA, A. P.

The influence of light on the flow of plastic substances from the leaves. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82: 481-3, bibl. 9.

From experiments with leaves of kok-saghyz collected at times of different intensities of illumination (on sunny, cloudy or variable days), it is concluded that the flow of plastic (elaborated) substances from the leaves, as with other physiological processes, depends on external conditions, particularly light.

950. KOLESNIKOV, P. A.

On carboxylase in kok-saghyz. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 85: 611-14, bibl. 6.

The carbohydrate exchange in fresh and sun-dried kok-saghyz roots is compared. In fresh roots the carboxylase substrate pyruvic acid is not used; in dried roots it is decarboxylated with the formation of acetaldehyde and partly also acetoin.

951. MEDVEDEV, P. F.

The dependence of the rubber content on the age of plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 79: 341-4, bibl. 4.

Material was examined from 20 species of laticiferous plants from 3 families, viz. Compositae (kok-saghyz, tau-saghyz, krym-saghyz, and 7 species of *Solidago*), Asclepiadaceae (7 *Asclepias* spp.) and Apocynaceae (3 *Apocynum* spp.). Plants with latex-bearing foliage do not show, as a rule, any increase in their rubber content after the second year; it depends rather on cultural and weather conditions. Plants with latex-bearing roots, however, show a steady increase in rubber content with age. In southern regions kok-saghyz is but little inferior to tau-saghyz, and produces almost twice as much rubber as krym-saghyz. Krym-saghyz when two years old shows rather pronounced rapid increases in rubber content, but in later years there is only a gradual increase.

952. PINEVIĆ, L. M.

Effect of post-harvest sun-curing on latex accumulation in kok-saghyz roots. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82: 159-60, bibl. 5.

A note on the favourable effect of sun-curing on latex accumulation in early lifted kok-saghyz roots. Earlier trials had shown that in roots lifted late or already dormant, sun-curing reduced the latex content.

953. PINEVIĆ, L. M.

The influence of anaerobic conditions on latex accumulation in kok-saghyz. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82: 797-9, bibl. 8.

Data are presented showing that growing kok-saghyz plants under a dark cover did not reduce their rubber content appreciably, but when the plants were covered up for the second time a substantial reduction in the rubber content did take place. Plants grown in a soil 100% saturated by flooding were found to contain only about 25% rubber compared with controls. Smearing vaseline and apricot oil on the leaves of kok-saghyz reduced the rubber content of the plants by about 36 and 44% respectively.

954. MARZOCCA, A., AND FANTI, O. D.

Extracción mecánica de caucho de kok-saghyz. (Mechanical extraction of rubber from kok-saghyz.)

Idia, 1952, 5(52): 14-16, bibl. 11, illus.

A brief review of methods used for the extraction of rubber from *Taraxacum kok-saghyz* is followed by an account of experiments carried out in Argentina on mechanical extraction by means of a modification of the method used for the extraction of rubber from guayule. The method was found very satisfactory.

955. DE RAFOLS, W.

Fermentación de raíces de *Taraxacum kok-saghyz* Rodin. (Fermentation of the roots of *Taraxacum kok-saghyz*.) [English summary ½ p.]

Bol. Inst. Invest. agron. Madrid, 1952, 12: 57-103, bibl. 133.

After a review of research on the subject the results are

given of laboratory experiments with 3 methods: (1) acid hydrolysis followed by fermentation with *Saccharomyces cerevisiae*; (2) direct fermentation with *S. fragilis*; and (3) hydrolysis followed by fermentation with inulase of *Aspergillus niger*. The second was the most successful and best conditions for it were a 5% concentration of total reducing matter, an initial pH of 5.5, and a constant temperature of 30° C. during 72 hours' constant agitation.

Seed and other oils.

(See also 121n, 1218, 1219.)

956. DOMINGO, W. E.

Cultivo del ricino. (Cultivation of the castor bean.)

Hacienda, N.Y., 1952, 47(4): 58-9, illus.

A brief account is given of the recent expansion of castor bean production in the U.S., of the numerous industrial uses of the oil, and of some recent improvements in plant types and harvesting practices.

957. IVANOV, V. K.

The application of granulated superphosphate in hills for castor oil plants. [Russian.]

Doklady vsesojuz. Akad. sel'sk. Nauk, 1952, 17(5): 31-3.

Castor oil plants in Russia are often interplanted with sunflowers and maize and for adequate nutrition direct fertilizer applications to the mound grown plants are recommended. Applying granulated superphosphate with the castor seed did improve yields, but side dressing two sides of the hill was more satisfactory. A 2 g. per side treatment produced the largest plants, giving the highest yield of seed, though 1 g. per side is considered sufficient and provided up to 18 kg. yield increase for each kg. of phosphoric acid supplied.

958. HILDITCH, T. P.

The drying oil in the seeds of *Mercurialis perennis* (Dog's Mercury).

Chem. Ind. Lond., 1952, p. 981, bibl. 4.

The seeds of this species, which is an abundant weed in England, yielded 17% of an oil rich in linolenic acid.

959. FRANCOIS, M.-T.

L'oitica et son huile. (Oiticica and its oil.)

Oléagineux, 1952, 7: 557-67, bibl. 130, illus.

In this review of the Brazilian tree, the oiticica, *Licania rigida*, the author gives an account of its history, botany and morphology and describes the manufacture, composition and uses of its oil. [Note the extensive bibliography.]

960. PROCHÁZKA, F.

Souvislost některých morfologických znaků máku s množstvím a velikostí semene, vzdorností proti napadání černí makovou (*Cladosporium herbarum*) a využití těchto poznatků při zušlechťování. (The relation between some morphological characters of poppy and the number and size of its seeds and its resistance to black rot (*C. herbarum*) and the application of these observations to breeding.) [Russian summary ½ p.]

Sborn. čes. Akad. Zeměd., 1952, 25: 13-20, bibl. 8, illus.

From observations made in 1950 and 1951 in Czechoslovakia on 2,000 plants of an unnamed poppy variety the author draws the following conclusions: The yield of seed is related to the number of capsules borne by each plant, but for breeding purposes the selection of productive plants with fewer capsules is recommended. The seed of plants with fewer capsules ripens more evenly and its harvesting is easier. Oblong and pear shaped capsules with the largest surface exposed to direct sun rays were most satisfactory for the development of seed and were also most resistant to *Cladosporium herbarum* infection. The yield of poppy seeds increased with the increasing size of capsules, number of stigmatic rays and number and size of locules.

961. ACEVEDO Y PINILLA, J. M.
Nuestros recursos naturales. (The natural resources [of Colombia].)
Agric. trop. Bogotá, 1952, 8(7): 17-21.

The wine palm, *Scheelea butyracea*, grows wild in vast quantities in Colombia. The kernel of the fruits contains 59% edible oil and the mesocarp 37%, and each palm in full production can yield 43 kg. oil a year. The desirability of exploiting more fully this natural source of oil is discussed.

Tannins and dyes.

(See also 969v, x, z.)

962. PARDO, L. L.
Estudio de las materias tanantes del urunday (*Astronium balansae* Engl.). (A study of the tannin materials in urunday (*Astronium balansae*).) [English abstract 8 lines.]
Lilloa, 1949, 18: 81-9, bibl. 10, illus., map [received 1952].

An account is given of the distribution and ecology of the tree in Argentina. The tannin materials extracted from it are listed and compared with those found in other species, and production figures for the period 1935-47 are cited.

963. HANUMANATHA RAO, P.
A note on wattles.
Sci. and Cult., 1952, 18: 92-4, bibl. 2.

Some confusion as to species and perhaps variety exists among wattles grown for tannin in South India. Analyses are tabulated for the tannins and non-tannins in the bark of *Acacia decurrens*, the green wattle, known locally as black wattle, and that of *A. dealbata*, the silver wattle, and these are compared with analyses reported elsewhere for 14 species, including these two and the true black wattle *A. binervata*.

964. ANON.
L'importance de la culture du mimosa pour l'Afrique du Sud. (The importance of wattle culture in South Africa.)
Marchés colon. Monde, 1951, 7: 3166, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 115.

The area under cultivation and the production of tannins from wattle in 1948 and 1949 are given. The importance of the industry has increased in recent years and its prospects are estimated.

Sundry plants.

965. FAVARD, P.
Les parasites du carthame dans le Languedoc toulousain. (The parasites of safflower in the Toulouse region.)
Progr. agric. vitic., 1952, 137: 132-4.

The pests and diseases of *Carthamus tinctorius* here described comprise vertebrates (birds and rodents), insects, flowering plants (species of *Orobanche*), and fungi. Notes on control are given.

966. THACKER, D. G., AND GOOD, H. M.
The composition of air in trunks of sugar maple in relation to decay.
Canad. J. Bot., 1952, 30: 475-85, bibl. 16, illus.

The internal air of maple trunks was found to vary considerably in composition, particularly in decaying trees. In all cases carbon dioxide occurred in much larger, and oxygen in smaller amounts than in the atmosphere. Carbon dioxide content was highest in the summer and lowest in mid-winter, oxygen varying reciprocally. Diurnal variations were also noted. Growth of maple rot fungi on malt agar was favoured by carbon dioxide in concentrations found in living trees. In several cases, optimum concentrations were of the order of 10%, growth being approximately double that in carbon dioxide-free air. Oxygen had little effect within the range of concentration occurring in trees. It is concluded that aeration is probably not an important factor in the development of decay, poor aeration tending to be stimulating rather than inhibiting. [Authors' abstract.]—Queen's University, Kingston, Ontario.

967. TIHON, L.
Pausinystalia macroceras (K. Schum) Pierre
—Synonyme: *Corynanthe macroceras* (K. Schum). (*Pausinystalia macroceras*, syn. *Corynanthe macroceras*.)
Bull. agric. Congo belge, 1952, 43: 797-808, bibl. 4.

Analyses of the bark of this rubiaceous species showed it to be of no practical value as a source of tannins. The content of alkaloids including yohimbine, commonly obtained from the related *Corynanthe yohimbe*, was low, but more comprehensive tests might show higher contents in other parts of the tree.

968. MÉNAGER, H.
Les *Eucalyptus* dans le Gharb (Maroc occidental). (The species of *Eucalyptus* in the Gharb (western Morocco).)
Rev. int. Bot. appl., 1952, 32: 309-55, bibl. 18, illus.

Descriptions are given of 21 *Eucalyptus* spp. cultivated in western Morocco for their products and for their rapid growth in regions unfavourable for other crops, followed by discussions on (1) the venation of the leaves, (2) the determination of the species by external characters, (3) polymorphism (natural and artificial selection), (4) hybridization, (5) soils, altitude and rainfall in the region where the trees are grown, (6) the essential oils of the species described, (7) the date of flowering and the properties of the honey yielded, (8) the origin of the eucalyptus plantations, (9) methods of planting, (10) choice of species, (11) the eucalyptus in relation to soil conservation, (12) conclusions drawn.

Noted.

969. a ANON.
Indian lemongrass oil.
Perfum. essent. Oil Rec., 1951, 42: 427, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 114.
Export figures and chemical data.
- b ANON.
Brazilian sassafras oil. [*Ocotea preciosa*.]
Perfum. essent. Oil Rec., 1951, 42: 416, 441, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 114.
Composition.
- c ANON.
Brazilië; de productie van carnaubawas. (The production of carnauba wax in Brazil.)
Lat. Amer., 1951, 5: 222-3, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 53.
From *Copernicia cerifera*.
- d ANON.
Eucalyptus oil in East Africa.
Perfum. essent. Oil Rec., 1951, 42: 426-7, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 114.
Analytical data.
- e ANON.
Nux vomica situation in French Indo-china.
For. Commerce Wkly, 1951, 45 (9): 18, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 155.
- f BASSET, H.
Les plantes à rotenone. (Rotenone-producing plants.)
Rev. int. Prod. colon., 1951, 26: 213, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 213.
The production of *Derris elliptica* in the Congo and French West Africa.
- g BOSE, S.
Rauwolfinine, the new alkaloid of the root of *Rauwolfia serpentina*, Benth.
Sci. and Cult., 1952, 18: 98, bibl. 3.
- h CUMBER, R. A.
Studies on *Oliarus atkinsoni* Myers (Hem. Cixiidae), vector of the "yellow-leaf" disease of *Phormium tenax* Forst. I. Habits and environment, with a note on natural enemies.
N.Z. J. Sci. Tech., Sect. B, 1952, 34: 92-8, bibl. 2, illus.
- i DARK, S. O. S.
Variability in Canadian wild hops.
A.R. Wye Coll. Dep. Hop Res. 1951, 1952, pp. 69-71, bibl. 2.
- j DESMARAIS, Y.
Dynamics of leaf variation in the sugar maples.
Brittonia, 1952, 7: 347-87, bibl. 56, illus.
Taxonomy and systematics.
- k DE GEUS, J. G.
Vezelcultures in Indonesië. (Fibre culture in Indonesia.)
Plant en Bodem, 1951, 10: 3-54, bibl., from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 110.
- l MIHLIN, D. M., AND PŠENOVA, K. V.
Method of vacuum infiltration in studying root-bearing rubber plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1952, 85: 653-5, bibl. 5.
Metabolism of kok-saghyz.
- m MINISTRY OF AGRICULTURE, LONDON.
Red spider mite on hops and other crops in the open.
Adv. Leafh. Minist. Agric. Lond. 226, 1952, pp. 4, 2d.
- n MITTAL, O. P., NEELAKANTAN, S., AND SESHADRI, T. R.
Chemical investigation of Indian lichens: Part XIV. Chemical components of *Ramalina calicaris* and *Ramalina sinensis*.
J. sci. industr. Res., India, 1952, 11B: 386-7, bibl. 9.
- o MONTAGNAC, P. R.
Le ricin à Madagascar. (The castor oil plant in Madagascar.)
Oléagineux, 1952, 7: 625-31, bibl. 9, illus.
- p MURRAY, J., AND STANLEY, B. G.
The essential oil of *Nothopanax simplex*.
J. appl. Chem., 1952, 2: 5-7, bibl. 12.
- q NAIR, G. V., POTI, A. N., AND PILLAY, P. P.
The constituents of lacquer-bearing trees of Travancore-Cochin: Part I—Chemical examination of the constituents of *Holygarna arnottiana* Hook F.
J. sci. industr. Res., India, 1952, 11B: 294-7, bibl. 7.
- r NAIR, G. V., POTI, A. N., AND PILLAY, P. P.
The constituents of lacquer-bearing trees of Travancore-Cochin: Part II—Chemical examination of the latex of *Semecarpus travancorica* Bed.
J. sci. industr. Res., India, 1952, 11B: 298-9, bibl. 1.
- s NAVES, Y. R.
Louro inhamuy oil of Amazonas (Brazil) (*Nectandra elaiophora* Barb. Rodr.).
Perfum. essent. Oil Rec., 1952, 43: 38-9, 53, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 252.
- t POOLE, A. L.
Phormium tenax, New Zealand hemp.
Brit. agric. Bull., 1952, 5: 88-93, illus.
A general account of the New Zealand industry.
- u PRADHAN, S. N., ROY, C., AND VARADAN, K. S.
Curariform substances from roots of *Cissampelos pareira* Linn.
Curr. Sci., 1952, 21: 172, bibl. 1.
- v PRASAD, J.
Saffron.
Kashmir, 1951, 1: 480-1, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 53.
Culture in Kashmir.

- w RAZDAN, R. K., AND BHATTACHARYYA, S. C.
Sesquiterpenes from *Piper cubeba*, Linn.
Sci. and Cult., 1952, 18: 148-9, bibl. 2.
From a yield of 5-8% essential oil from the fruit.
- x RAYMOND, W. D.
The use of acacia pods and bark as tanning materials.
Colon. Plant Anim. Prod., 1951, 2: 285-91, bibl. 3 [received Sept. 1952].
- y SAWHNEY, P. L., AND SESHADRI, T. R.
Alkaloid from *Coptis teeta* Wall.
J. sci. industr. Res., India, 1952, 11B: 308-9, bibl. 3.
Umbellatine from roots.
- z SHIBAMOTO, T., MINAMI, K., AND KUBOTA, S.
Content of tannin in the barks of *Acacia mollissima* in Chiba Prefecture.
J. Jap. For. Soc., 1950, 32: 295-6, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1950/51, No. 1, p. 83 [received Aug. 1952].
From 22 to 29%.

970.
a SUOMALAINEN, P.
On the carotin content of the berries of the sea buckthorn, *Hippophaë rhamnoides* L.
Arch. Soc. zool. bot. fenn. "Vanamo", 1947 (issued 1949), 2: 60-1, bibl. 4 [received 1952].
The average carotene content was 3.3 mg.% or 38.7 mg.% of the dry weight.
- b SUZUKI, Y.
Studies on bamboo. V. Individual differences and variations due to the locality found in physical properties of *Phyllostachys pubescens* Magel. VI. Dependence of the mechanical properties of *Phyllostachys pubescens* Magel upon the moisture content.
Bull. Tokyo Univ. For., 1950, 38: 167-77 and 181-6, from abstr. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1950/51, No. 1, pp. 77-8 [received Aug. 1952].
- c WIESNER, K., AND OTHERS.
Pithecolobine, the alkaloid of *Pithecolobium saman* Benth. I.
Canad. J. Chem., 1952, 30: 761-72, bibl. 2.
From the bark of the tree.

FLORICULTURE.

General.

(See also 2, 20, 30-32, 49, 90, 104, 107-115, 675, 689, 690, 1089k, 1090f, 1225, 1231, 1421.)

971. SAMBROOK, J.
The British flower industry.
Times Survey Brit. Agric., July 1951, p. 10, illus.

The effects of unregulated foreign imports up to 1931 and of the second world war on the British flower industry are examined, and its present position and prospects are briefly discussed.

- 972.* WASSCHER, J.
The Netherlands Inspection Service for Ornamental Plants.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 3.

The author describes the benefits which have already been derived from the work of the Netherlands Inspection Service for Ornamentals [N.A.K.S.] since its establishment in 1947 in its two sections which concern carnations and cyclamen respectively.

973. WASSCHER, J.
Enige indrukken over de bloementeel in nord-west Duitsland. (Some impressions of commercial flower growing in northwestern Germany.) [English summary $\frac{3}{4}$ p.]
Meded. Dir. Tuinb., 1952, 15: 389-418, bibl. 34, illus.

The growing of ornamental plants has expanded greatly in recent years in N.W. Germany due to the foundation of a Horticultural University College at Hanover, where research is being carried out, and the reorganization of the experimental gardens at Kleefeld and at Fünfhausen which specialize in cultural methods and variety trials.

* See note, p. 3.

Accounts are given of various activities such as: the use of a standard potting soil ("Einheitserde") suitable for most plants; hydroponics; sub-irrigation of potted plants and asparagus; control of pests, E605 being commonly applied and the systemic insecticide Systox showing promise; short day treatment of kalanchoë and Lorraine begonias; overhead irrigation by sprinklers particularly for azaleas; and cyclamen seed inspection. At the Institute of Horticultural Technique (at Hanover) methods for increasing the speed of garden operations such as digging and potting are recorded by "tracer" photographs.

- 974.* CHOPINET, R.
La conservation des semences en atmosphère sèche. Son intérêt en sélection. (Seed storage in a dry atmosphere. Its advantages in plant selection.) [English summary $\frac{1}{2}$ p.]
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 11.

Microbiotic seeds with a germination life of less than 3 years and even mesobiotic seeds with a life of 3 to 15 years offer particular storage problems. The results are tabulated of successful storage trials, mainly on flower seeds, conducted in recent years at the Vilmorin laboratories, using sealed containers, dry atmosphere and special small bags. A more extended use of inexpensive seed storage on the lines suggested is urged. It would be of considerable value for those attempting to build up collections of living plants.

- 975.* BALZOUR, A. P.
A seedsman's experiences in plant breeding.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6.

A short description is given of the work of a plant

* See note, p. 3.

breeder in raising new forms in annuals and related garden plants. The main principles guiding such work are: 1. The introduction of new species from abroad. 2. The search for useful variations in existing varieties of plants which may provide an improvement for present day conditions. 3. The actual hybridising between two forms, whether varieties, or species, or genera, with the definite object of creating a new plant. 4. The production of polyploidy by outside agencies, such as colchicine, etc. 5. The upkeep of the standard of existing seed stocks. Very great importance is attached to this aspect of the work. There are, in addition, one or two qualifications which are indispensable to the successful practical plant breeder. One of these is a thorough all-round knowledge of the plants with which he is dealing. He must also have an instinctive knowledge of what constitutes a good garden plant—in other words an eye for a good garden plant, and a clear idea as to how the plant he is working with may be developed to advantage. A detailed description is given of the raising of new hybrids in *Venidium*, *Arctotis* and *Godetia*. [Author's summary.]

- 976.* HANGER, F. E. W.
Recent developments in plant propagation,
including the after treatment of seedlings.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 12.

The main points dealt with in this paper on the propagation of ornamentals are the use of vermiculite, the use of growth stimulants, optimum conditions for raising seedlings and propagation of hardwood cuttings in electrically soil-heated frames.

- 977.* VAN ONSEM, J. G.
Synergistic effects of hormone mixtures on
the rooting of cuttings.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 8.

In a series of experiments the influence of growth hormone combinations on the rooting of cuttings of different test plants has been investigated. Marked synergistic effects could be observed. Experimental material included a number of ornamental plants and the substances β -indolylbutyric acid, α -naphthalene-acetic acid, β -indolylacetic acid and benzoic acid. [From author's summary.]

- 978.* DESHUSSES, L. A., AND DUPERREX, A.
Cultures florales dans des milieux de
structure définie; recherche d'un milieu
standard de culture. (The cultivation of
flowers in known media. The search for a
standard medium.) [English summary ½ p.]
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 7.

The authors who have evolved their own media and have compared standard, easily reproducible media consisting of granular peat, fibrous peat and river sand rich in calcium with old established horticultural composts discuss the problems involved. They consider the structure of the solid medium to be all important. As a measure of this structure they propose the determination of the total porosity and the microporosity after the medium has been drained naturally. The standard composts studied by them have the advantage of being

porous and permeable and retaining these properties for a sufficient length of time. They consider that their standardized media are comparable with the John Innes composts and are of local rather than general interest. They outline their method of watering with a fertilizer solution without lime or chlorides or any provision being made for minor elements.

- 979.* CHADWICK, L. C.
The effects of organic mulches on soils and
the subsequent growth of some ornamental
plants.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 7, bibl. 14.

The experiments reported in this paper deal primarily with the effects of ground corncocks and sphagnum peat moss mulches on soil structure. Results of experiments reported indicate that the organic matter content of a soil mulched with 2½ inches of ground corncocks is more than double that of unmulched soil after a three-year period. Soil plots mulched with peat moss showed a somewhat greater organic matter content than soil from unmulched plots. Non-capillary porosity and total porosity were lower in outdoor soil plots mulched with ground corncocks than in clean cultivated plots. Soil plots mulched with peat moss showed the highest per cent. of non-capillary pore space. This relationship did not prove true under greenhouse conditions. The percentage of stable soil aggregates was higher under a mulch of ground corncocks than in soils mulched with peat moss or from unmulched plots. There was also a high percentage of large aggregates in soils under the ground corncob mulch. A high degree of soil aggregation and high non-capillary porosity is not always associated with increased plant growth or bloom production. Above a certain point these factors do not seem to become limiting to growth and bloom production of hybrid tea roses. A mulch of ground fresh corncocks was much more effective in increasing the percentage of stable soil aggregates and non-capillary and total porosity than ground old corncocks under the conditions of this experiment [in Ohio]. [Author's summary.]

- 980.* KLOUGART, A.
Diagnostic technique applied to floriculture.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 6.

In floriculture diagnosis can be based on crop differences—good and poor areas in the same crop—and the causes can in many cases be found by analysis. Among diagnostic methods the Sachs iodine test can be used for carbohydrates. Thermohygrographs placed in a greenhouse will record a possible bad indoor climate. Soil water can be recorded by Bouyoucos blocks placed in the soil. Test plants should be used for detecting gases or toxic substances. Soil analysis for soluble salts (soil conductivity) is the most useful of the diagnostic methods in the greenhouse and a frequent control should be made of fertilizing and watering practices. Analysis for soil pH should be possible, roughly in the field and more accurately in the laboratory. Soil analysis for major nutrients is necessary and the rather simple quick-test is most valuable, but the potassium test should be made to complete it. The minor elements need more accurate procedures, but here the "Roach injection methods" are better than analysis. Testing of the plant

* See note, p. 3.

* See note, p. 3.

tissue for nitrate, K and P can give good supplementary information and the filter paper methods are recommended. Bray's nitrate powder, and Na-dipicrylamine-treated paper are simple and good tools. An analysis will show what fertilizer may be needed but not the amount necessary for optimum growth. This will be revealed only by trial and experience. [Author's summary.]

981.* POST, K.

Temperature and flowering of ornamentals.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 10.

After noting that flower bud initiation or development may be greatly affected by temperature and that light intensity or photoperiod affects the reaction of many plants to temperature, the author gives lists of 3 classes of plant, viz. (1) those which need a temperature below a critical point for flower bud initiation or some phase of flower bud initiation, (2) those that need a temperature above that point for the same purpose, and (3) those needing special combinations of temperature and light.

982. ALLEN, F. H.

Flower forcing for early market on a Dutch nursery.

J. roy. hort. Soc., 1952, 77: 320-32.

An account is given of the methods used on a Boskoop nursery for the production of forced blooms of prunus, azalea, forsythia, rhododendron, hybrid tea and polyantha roses and chrysanthemum.

983. POST, K., AND FISCHER, C. W., JR.

Commercial storage of cut flowers.

Ext. Bull. Cornell agric. Exp. Stat. 853, 1952, pp. 14, illus.

Freshly cut, healthy flowers of most species (but not orchids and gladioli) can be kept in good condition for periods of 2 weeks or more in some cases when stored in water-and-vapour-proof dry packs at 31° F. At this temperature the respiration rate is about half that at 50° F. and about a quarter that at 65° F., maturation and colour change are very greatly retarded, ethylene gas is not generated in harmful concentrations, and fungal growth is practically inhibited. A description (including diagram) is given of a deep-freeze unit and the importance of precise temperature control and good air circulation is stressed. Dry packs are cellophane wrappers, paraffin-waxed wooden boxes overwrapped with cellophane or metal containers. After storage flowers require hardening before marketing by placing in water at 80-100° F. for 6-8 hours.

984. PRITCHARD, A. E.

Malathon on ornamentals.

Calif. Agric., 1952, 6 (10): 6.

Malathon, an organic phosphate insecticide allied to, but less toxic to warm-blooded animals than, parathion and TEPP, has proved effective in controlling several scale insects, mites and aphids on ornamentals grown under glass. Cases of phytotoxicity are recorded, but observations following treatment of over 100 kinds of plant suggest that malathon is less injurious than many other insecticides.

* See note, p. 3.

Annual and herbaceous plants.

(See also 60, 519, 560, 1089d, f, l, o, r, t, v, x, 1090g).

985. SAITO, K.

Studies on inducing polyploid flower plants and their utilization. IV. On several polyploid plants of pansy, primrose and others. [Japanese, with English summary $\frac{3}{4}$ p.]

J. hort. Ass. Japan, 1951, 20: 77-82, bibl. 7, illus.

Descriptions are given of polyploid plants induced by colchicine treatment in species of *Viola*, *Primula*, *Lychnis*, *Thunbergia*, *Mirabilis* and *Ipomoea*. While most of these are usually vigorous, cases have occurred, e.g. in *Lychnis coronata*, in which the polyploid plants are much dwarfed.

986. SAITO, K.

Studies on inducing polyploid flower plants and their utilization. V. On several polyploid plants of snapdragon, petunia and others. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1952, 20: 199-201, bibl. 2, illus.

Several new polyploid plants of antirrhinum, petunia, phlox and verberna raised in 1950 are described.

987. SAITO, K.

Studies on inducing polyploid flower plants and their utilization. VI. On several triploid flower plants obtained by crossing between induced tetraploids and diploids. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1952, 20: 202-4, illus.

New triploid plants are described of stock, wallflower, dianthus, petunia, phlox and verberna, which have resulted from crosses between induced tetraploids and normal diploids.

988. NOORDAM, D.

Lycopersicum-virus 3 (tomato spotted wilt) bij enkele bloemisterijgewassen. (Lycopersicum-virus 3 (tomato spotted wilt) on some ornamental plants.) [English summary 1 p.]

Tijdschr. PlZiekt., 1952, 58: 89-96, bibl. 29, illus.

The tomato spotted wilt virus was determined by sap inoculation on *Nicotiana glutinosa*, *N. tabacum*, and *Petunia hybrida*. The symptoms are described on these plants and on *Nicotiana paniculata*, *N. rustica* and *N. silvestris*, as well as on the ornamental plants *Begonia tuberhybrida*, *Campanula isophylla*, *Calceolaria herbaceihybrida*, *Capsicum annuum*, *Gerbera jamesonii*, *Senecio cruentus* (cineraria hybr.) and *Sinningia hybr.* (gloxinia).

989. KOFRANEK, A. M.

Lighting China asters out-of-doors for early spring bloom.

Bloom News, 1951, 3 (11): 4-7, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 82, p. 2.

Several aster varieties were made to flower 3 months earlier than normal by planting seeds 27 December or 14 February, and giving 4 hours of supplementary light out-of-doors in California. First flowers were cut 31 March on the early planted lot, whereas normal flowering was 30 June.

990. JEFFERSON, R. N., AND EADS, C. O.
Control of leaf miners and other insect pests
of asters.
J. econ. Ent., 1952, 45: 476-81, bibl. 9.

In trials conducted at Los Angeles parathion was found more effective against the leaf miner, *Liriomyza langei*, the most serious pest of asters in the area, than chlordane, toxaphene, BHC and ethyl p-nitrophenyl thionobenzenephosphonate. Whiteflies and leafhoppers were also controlled by parathion.

991. KEMP, P. J., AND WAY, J. M.
Constant water level system for carnations
in Sweden.
Fruitgrower, 1952, No. 2954, pp. 217-18,
illus.

A description is given of the beds and apparatus used in the constant water level system of carnation growing in a Swedish nursery. Cuttings taken in November are rooted in sand and are transplanted straight into the beds in March-April. The plants are grown for 2 years and then discarded, the soil being changed at the same time. Among varieties, Sim carnations are the most favoured, and others grown include Maine Sunshine, Orchid Beauty and Pink Fisher. For pest control 4 different insecticides are applied in turn, at more or less regular intervals; sulphur is used as a fungicide.

- 992.* DESHUSSES, L. A., AND DUPERRER, A.
Culture sans terre de l'oeillet américain.
(Soilless culture of carnations.) [English
summary 8 lines.]
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 3, bibl. 9.

The authors' trials suggest that soilless culture of carnations, though economical, demands great care and is unlikely to supersede older methods.

993. VINOT, —, AND BOUSCARY, —.
Résultats obtenus en culture d'oeillets sur
sable. (Results obtained in the sand culture
of carnations.)
Rev. hort. Paris, 1952, 124: 742-5.

With similar cultural methods the 3 types of apparatus previously described [*H.A.*, 22: 4133] gave almost identical yields. Yields varied, however, with different cultural methods. Notes are given on the pH of the nutrient solutions, temperature in the tanks, depth of sand (average number of flowers per tank rather higher and per plant rather lower with sand at 20 cm. depth than 15 cm.), density of planting (3,399 per tank at 15 × 20 cm. compared with 2,880 at 20 × 25 cm.).

994. BEACH, G.
Effect of ammonium sulphate and potassium
chloride on Patrician carnations in soil.
Proc. Amer. Soc. hort. Sci., 1952, 59: 484-6,
bibl. 1, being *Pap. sci. J. Ser. Colo. Exp.*
Stat. 317.

Maintaining soil nitrate levels at 100 to 140 p.p.m. resulted in fewer split calyces than when levels of 20 to 60 p.p.m. were maintained. The addition of K reduced the proportion of splits in the low nitrate plots. There were no other significant differences between treatments in the quality of flowers produced.

* See note, p. 3.

995. GILPATRICK, J. D., AND WEINTRAUB, M.
An unusual type of protection with the car-
nation mosaic virus.
Science, 1952, 115: 701-2, bibl. 3, being
Contr. Div. Bot. Plant Path., Sci. Serv., Dep.
Agric., Ottawa 1161.

In tests with 2 clones of *Dianthus barbatus* that reacted to inoculation with the carnation mosaic virus by the development of primary local lesions only, apparently normal leaves from previously inoculated plants were almost completely protected against re-inoculation with the virus, whereas leaves from healthy plants reacted with the formation of abundant lesions. Similarly juice transfers from apparently healthy leaves of previously inoculated plants of these 2 clones failed to induce lesions in healthy plants of the same clones and a third more susceptible clone, whereas juice transfers from primary local lesions readily induced symptoms. This form of protection, believed to be unique, is discussed in the light of the generally accepted hypothesis of protection.

996. SCHMIDT, T.
Alternaria dianthicola als Erreger einer
Blütenknospenfäule in Österreich. (*Alter-*
naria dianthicola as the causal pathogen of
a [carnation] blossom bud rot in Austria.)
[English summary 3 lines.]
PflSch. Ber. Wien, 1952, 9: 1-16, bibl. 36,
illus.

The causal agent of a bud rot of carnation, which assumed epidemic proportions in Austria in 1950 and 1951, was isolated and identified as *Alternaria dianthicola* Neerg. Re-inoculation of the isolated fungus confirmed the diagnosis. In contrast to observations in Denmark, where Neergaard first described the species, the symptoms remained confined to the buds, no spots occurring on leaves or stems. Tests with fungicides, which have so far been unsuccessful, are to be continued.

997. ANDREWS, P. S., AND WATSON, D. P.
Stages in anatomical development of the
flower head of *Chrysanthemum morifolium*
Bailey.
Proc. Amer. Soc. hort. Sci., 1952, 59: 516-22,
bibl. 13, illus., being *J. Art. Mich. agric. Exp.*
Stat. 1283.

The stem apices of rooted chrysanthemum cuttings of variety Gold Coast, transferred to controlled temperatures and short photoperiods for 36 days, were examined at 3-day intervals. Four stages of bud development are described: the young vegetative tip, the transitional stage, the young reproductive tip and the more developed reproductive tip. Cellular arrangement and development are discussed briefly in relation to findings on chrysanthemums and other plants reported in the literature.

- 998.* SCHWABE, W. W.
Effects of temperature, day length and light
intensity in the control of flowering in the
chrysanthemum.
[*Mim. Pap.*] 13th int. hort. Congr., London,
1952, pp. 6.

A vernalization period of 3-4 weeks is required for bud initiation. This may be interrupted daily by periods at

* See note, p. 3.

normal temperatures. Re-rooting of vernalized cuttings does not affect the stimulus received. The vernalization requirement is annual: basal shoots on vernalized plants must be vernalized themselves. Continuous long day treatment delays initiation, but limited periods hasten the process, this effect being maximal with full vernalization. High temperature treatment has no de-vernalizing action. The time required for bud initiation is affected markedly by seasonal changes in light intensity. Prolonged low intensity light treatment in short days causes complete de-vernalization. For further development of the inflorescence buds short days are necessary. When exposed to long days development does not proceed beyond the formation of a bare receptacle: no florets are produced. In long days further development can be secured, (1) by removal of all lateral shoots, (2) by rooting the detached inflorescence. Young inflorescence buds produced in short days can be inhibited, (1) by transfer to long days, (2) to short days at low light intensity, (3) by application of auxin paste. [From author's summary.]

999. WILL, R.

Chrysanthemum tests.

Ohio Flor. Ass. Bull., 1951, No. 267, pp. 3-6, from abstr. in *Bull. N.Y. St. Flower Grs.*, 1952, No. 82, p. 2.

Sea Gull chrysanthemums were delayed in flowering depending on the length of time at night during which they were kept at a high temperature (90° F.). Limiting the number of stems and spacing of plants failed to produce more than 40% pompon stems within the grade 1-5 to 2-0 oz. each. Planting at successive dates produced crown buds in similar succession. The author claims these tests show conclusively that chrysanthemums form flower buds regardless of day length but in accordance with age of stem.

1000. PRENTICE, I. W.

Chrysanthemum flower distortion survey, 1951.

Plant Path., 1952, 1: 77-80, bibl. 8, illus.

The symptoms of this disorder, which is thought to be a virus disease, are "breaking" of the flower (white or yellow streaks on coloured petals) or distortion of the florets. The survey indicated that the disease is widespread in England and Wales. There is a high percentage of infection in some stocks, but the average over the country is low. In general, infection was low on carefully managed and well-run holdings. Instances occurred in which symptoms in a stock of a variety seemed to be more obvious or less obvious depending on the method of culture (pots or beds) or on the type of flower buds which had been "secured". Growers are advised to select plants for propagation in flower. A seriously infected stock should be destroyed and replaced from a reputable source.

1001. NOORDAM, D.

Virusziekten bij chrysanten in Nederland. (Virus diseases of chrysanthemum in the Netherlands.) [English summary 3½ pp.] *Tijdschr. PlZiekt.*, 1952, 58: 121-90, bibl. 91, illus.

Since 1945 there has been a serious increase in virus diseases of *Chrysanthemum indicum* in the Netherlands; this is attributed to the importation of new varieties

from England, and, to a lesser degree, from the United States. Nearly 400 virus-infected plants of 116 varieties have been studied, the symptoms described, and the viruses determined by means of indicator plants. Two viruses frequently found were a strain of *Cucumis virus 1*, here named *Cucumis virus 1 st. Chr.*, and an unknown virus referred to as *virus b*. In addition, a "stunt" virus was identified, while another (*virus c*) was only once found. Detailed descriptions of their characters are set out, and the varieties on which the different viruses have been found are recorded. Control measures are discussed. Propagation from infected plants should be avoided and a system of inspection introduced.

1002. BRIERLEY, P.

Steps to the goal of virus-free mums.

Flor. Exch., 1952, 118(21): 9, 45, illus.

A method of graft indexing chrysanthemums on mistletoe varieties used at the U.S. Department of Agriculture, Beltsville, is described. Of 147 varieties or breeding lines tested 34 were discarded for stunt, 15 for mosaic and 2 for aster yellows infection. Older named varieties and the newer numbered lines had essentially the same stunt content, which is spread chiefly by handling under glass. Mosaic was very much more prevalent on the older varieties; this disease is spread in the field by a yet unnamed insect, but is not transmitted by handling. The method of maintaining virus free stock is outlined.

1003. A., F. W.

Testing for chrysanthemum mosaic.

Gdnrs' Chron., 1952, 132: 14.

A simple method of testing chrysanthemums for mosaic virus, developed at the Cheshunt Research Station and within the capacity of growers, is described. Three to four chrysanthemum leaves crushed with one dessert-spoonful of $\frac{1}{2}\%$ sodium sulphite solution are swabbed on carborundum dusted leaves of *Nicotiana glutinosa*. If the sap transmitted is from a diseased plant the test plant develops obvious mosaic symptoms in 10 to 30 days, according to the season of the year—more quickly in spring and summer than in winter.

1004. ZOBRIST, L., AND BOUCHET, R.-L.

La lutte chimique contre la maladie vermiculaire du chrysanthème. (The chemical control of chrysanthemum eelworm.)

Rev. hort. suisse, 1952, 25: 175-82, bibl. 9, illus.

The experiments on which the following recommendations are based were carried out at Dielsdorf, Switzerland, and Lyons, France, with about 7,000 chrysanthemum plants of approximately 90 large-flowering varieties. The spray used was the proprietary parathion (15%) suspension, Aralo, applied at the most favourable concentration of 0.2% (=30 g. of the active agent per 100 l.). Particularly susceptible varieties, such as Mrs. R. C. Pulling, required a slightly higher concentration. Very satisfactory control of *Aphelenchoides ritzemabosi* is claimed for the following schedule which also suppressed other pests as well as nematodes. (1) Stools should be treated when the new growth is about 3 cm. high. On plants badly affected the previous year the application may be repeated 10-15 days later. (2) Cuttings should be treated after rooting, no repetition being required except in special cases. (3) For plants under

glass 2-3 applications are sufficient for the period between potting and 4-5 weeks before flowering. (4) According to observations made in the wet season of 1951 one application per month should afford protection to outdoor plants. (5) Established plantings should receive 5 applications at intervals of 3-4 weeks starting before the end of May. In small-scale trials encouraging results were also obtained with 0.2% Aralo against *Aphelenchoides olesistus* in begonia and saintpaulia, *Ditylenchus dipsaci* in phlox and *Tylenchus devastatrix* in chives. The chemical was found to mix well with fungicides. No plant injury occurred.

1005. PIQUER, G.

Le nématode ou anguillule du chrysanthème. (The chrysanthemum eelworm.)
Bull. hort. Liège, 1952, 7: 291-6, bibl. 12, illus.

A review article describing the morphology, biology and control of *Aphelenchoides ritzema-bosi*. Preventive measures are: the use of healthy cuttings and soil, burning of infected material, avoidance of splashing soil or water on the plant in watering, ringing the base of the stem with vaseline. For chemical control sodium selenate is effective but its toxicity and persistence in the soil limit its usefulness; parathion and E.605 are also effective but are toxic and expensive on account of the number of applications necessary.

1006. SACHS, H.

New information on the control of nematodes with E605 forte.
Höfchen Briefe (English edition), 1952, 5: 20-32, bibl. 4.

Four to six applications of E605 forte at a concentration of 0.05-0.033% controlled the leaf nematodes *Aphelenchoides olesistus* and *A. ritzema-bosi* in begonia and chrysanthemum respectively. A fine nozzle should be used for wetting the plants thoroughly. Spraying the soil around potted or outdoor plants killed the eelworms in the top layers and, by the creation of a lethal zone, stopped the pest from rising to the surface from deeper soil levels. No plant injury occurred.—Zool. Inst. Erlangen.

1007. DORMER, K. J., AND BENTLEY, J. A.

Some complex relationships between auxin content and leaf area in *Ipomoea caerulea* Koen.
New Phytol., 1952, 51: 116-26, bibl. 5.

A morphological interpretation is presented of the differences observed in auxin production between successive leaves along the length of a shoot of *Ipomoea caerulea*. The auxin determinations were carried out on each leaf when it had attained an area of approximately 10 sq. cm. The auxin concentrations fluctuated in an apparently irregular manner from node to node. Corresponding fluctuations were exhibited by an integral function calculated from measurements of leaf area only and which expresses the amount by which the enlargement of one leaf lags behind that of the one below. It is suggested that the observed fluctuation in the auxin content of leaves 10 sq. cm. in area is due entirely to complex timing effects, the enlargement of the leaf being advanced or retarded, relative to internal physiological changes, according to the position of the leaf on the stem. It is suggested that these variations

result from a transitory and imperfect state of decussate phyllotaxy, presumably caused by the presence of 2 opposite cotyledons, and expressing itself as a tendency for some of the lower leaves to develop in pairs.—Univ. Manchester.

1008. BRAIN, E. D.

Seasonal variation in the response to gravity of *Lupinus polyphyllus* seedlings.
New Phytol., 1952, 51: 48-55, bibl. 8, illus.

An attempt has been made to correlate variation in response to gravity of *Lupinus polyphyllus* seedlings with the rate of growth and development of the seedlings in different months of the year and under different periods of illumination. The geotropic response was estimated by determining the percentage of plants which responded by a visible curvature after a stimulus (period of horizontality) of 20 min. at 20° C. Percentage response declined in the winter months. The seasonal variation was found to be related to the stage of development of the seedling, and was more apparent when the epicotyl began to develop than before the cotyledons had opened. The rate of development of the epicotyl decreased in winter, but by increasing the period of light the geotropic response and the rate of development of the epicotyl was raised to the summer level. An increased period of stimulation in January produced a percentage response equivalent to that of the summer months but the effect was not so marked in November. It is suggested that this variation in geotropism can be correlated with the effect of the season on hormone production and statolith efficiency in the developing seedling.

1009.* KOBEL, F.

La transformation par mutation et sélection de *Primula malacoides* durant les dernières 25 années. (Mutation and selection in *Primula malacoides* in the last 25 years.)
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 4.

Primula malacoides gives an excellent example of the important role played by hereditary mutation in the development of new varieties of cultivated plants. The pale mauve colour of the wild species was first changed to an intense carmine and then to a pale salmon which gave rise to an intense salmon or salmon pink. Other colour mutations are pale blue, a more or less intense blue, and white. A new form found at Wädenswil is bi-coloured, the centre of the petals being purple and the edges colourless or only slightly coloured. A recessive gene which causes colour formation to continue after the buds open changes the carmine to carmine-purple, the salmon pink to brown-purple and the blue to blue-violet. Besides the colour mutations, a great number of hereditary changes have been produced affecting size and form of flowers, shape of petals, flowering stems, leaves, season of flowering, the production of farina, etc. Among the mutations affecting the number or form of the chromosomes, the tetraploid forms play the greatest part in improvement, since the doubling of the chromosomes results in the production of larger and firmer leaves and larger, less delicate flowers. [Author's summary.]

* See note, p. 3.

1010. NEERGAARD, P.

Centrospora root rot of *Primula malacoides*, a serious soil-borne disease in Denmark.

Plant and Soil, 1952, 4: 128-40, bibl. 9, illus.

A root rot of *Primula malacoides* has caused very considerable damage in at least one nursery in Denmark since 1932. The mycelium isolated from the roots was identified as *Centrospora acerina* and reinoculations proved the fungus to be responsible for the disease. The soil was shown to be the source of infection and experiments carried out in successive years indicate that adequate control is achieved by steam sterilization. In no case was the disease found to be seed-borne. In view of the wide host range of the fungus affected plants should be destroyed.

1011. SEVERIN, H. H. P., AND TOMPKINS, C. M.

Aphid transmission of a mosaic virus and symptoms of other virus diseases of *Primula obconica*.

Hilgardia, 1950, 20: 279-98, bibl. 26, illus. [received 1952].

The symptoms of a mosaic virus on *Primula obconica* are described and illustrated. Nine species of aphid, seven of which do not multiply on the primula, were found to be vectors of mosaic. The symptoms are also described and illustrated for plants of *P. obconica* infected with western-cucumber-mosaic, celery-calico, common-cucumber-mosaic, tomato-spotted-wilt and California-aster-yellows viruses. The primula proved to be a symptomless carrier of ordinary-tobacco-mosaic virus.

1012. JONES, M. R.

Propagating saintpaulias.

Gdnrs' Chron., 1952, 132: 134-5, illus.

Propagation of saintpaulias by division is suitable for varieties with variegated foliage, and seeds are used mainly for the production of new varieties. Increase is usually carried out by leaf cuttings, producing flowering plants within 6-9 months. At the University of Nottingham School of Agriculture 8 different treatments were tested on *Saintpaulia ionantha* var. Rothamsted Lady, combining different times of potting and old leaf removal. It was found that of the cuttings transplanted when the new leaves were about 1½ cm. long and barely expanded those on which the old leaf remained produced the largest leaf area after 5 weeks in pots. Plants potted when the young leaves were expanded to about 1 cm. in diameter, however, appeared to form larger leaf areas, and with these non-removal of the mother leaf, or removal when the plants reached the rosette stage, seemed best.

1013. DEBUISSON, J.

La duplicature des giroflées quarantaines. (The production of double stocks.)

Bull. hort., Liège, 1952, 7: 203-8, bibl. 11.

Research at Gembloux and elsewhere is reviewed. The procedure for obtaining a high percentage of double-flowered plants is summarized as follows: (1) sow in pans at about 20° C.; (2) when the cotyledons show, place the pans in full light at 12° C.; (3) when difference in colour shows, eliminate the plants with dark green cotyledons; (4) remove weak plants on thinning out; (5) place the young plants in a temperature of 16-17° C. to cause the appearance of indentations on the leaves

and eliminate all those which do not show them 10 days after the majority has done so.

1014. KEYES, C. G.

Survival of fall and spring sown sweet pea seed when germinated before planting.

Proc. Amer. Soc. hort. Sci., 1952, 59: 523-6, bibl. 4.

Seeds of 6 sweet pea varieties were sown in 2 years in the autumn and in the spring, both unsprouted and sprouted at room temperatures (to simulate the optimum germination temperature of 68° F.). The results suggest that sprouted seed is more resistant to decay and breakdown than unsprouted seed. The latter sown in the autumn was a failure in both years, whereas autumn sown sprouted seed gave a good stand in the first year when the winter was relatively mild. Sprouted seed gave better stands with spring sowings in both years.—Univ. Conn.

1015. SPARRE, B.

Systematical and nomenclatural studies in the genus *Viola*. I. An attempt at a revision of the section *Chilenium*. [Spanish summary 5 lines.]

Lilloa, 1949, 17: 377-416, bibl. 13, illus. [received 1952].

In this revision of the section *Chilenium* of the genus *Viola* the author gives keys for the identification of the species, variations and forms, and notes on their morphology, taxonomy and distribution. The distribution is also shown on maps. One new species, *V. rudolphi*, and some new forms are described.

1016. COOPER, C. C., AND WATSON, D. P.

Influence of daylength and temperature on the growth of greenhouse violets.

Proc. Amer. Soc. hort. Sci., 1952, 59: 549-53, bibl. 8, illus., being *J. Art. Mich. agric. Exp. Stat.* 1284.

Plants of *Viola odorata* var. Fries Favorite were grown under 4 sets of conditions involving night temperatures of 40° and 50° F. and photoperiods of 8 and 16 hrs. It required 10 weeks of short days to produce saleable flowers, the flowers produced at 50° F. night temperature being larger than those formed at 40° F. Providing long days to promote vigorous growth and large leaves followed by short days proved of little value, because the production of the short day foliage type had to precede the production of short day flowers. The chasmogamous flowers produced under short, and the useless cleistogamous flowers produced under long, photoperiods are clearly illustrated.

Bulbs, tubers, etc.

(See also 15, 1089b, i, z, 1090b.)

1017. DEKKER, P.

Succesvol vervroegen van bolgewassen. (Successful acceleration of the flowering of bulbs.)

Cult. Hand., 1952, 18: 509-11, illus.

Instructions are given for the treatment of tulip, narcissus and hyacinth bulbs with regard to storage temperature and date of planting, in order to obtain blooms that are very early, early, late, and very late respectively. Notes are also given on the treatment of hippeastrum and muscari for Christmas blooming.

1018. DARVÈS-BORNCZ, R.

Traitement technique des bulbes floraux dans la région Varoise. (Temperature treatment of flowering bulbs in the Varoise district.)

Rev. gén. Froid, Sept. 1951, pp. 923-5, from abstr. in *Jardins Fr.*, 1952, 6: 167.

The temperature treatments given to forced gladioli, tulips, narcissi and anemones in the Varoise district of France are summarized.

1019. ABBISS, H. W.

Bulb sterilising makes progress.

Fruitgrower, 1952, No. 2960, pp. 497-8, illus.

A description is given of an up-to-date, public bulb sterilizing plant for narcissi installed in western England. Some special features of the plant include: (a) screened-off rooms for dirty and clean material, (b) the overhead loading and unloading of the bulbs in bulk cages by electric hoists, (c) a combination of an oil fuel steam boiler and electric heating elements with thermostatic control.

1020. MORET, —.

La culture des anemones. (Anemone growing.)

Terre maroc., 1952, 26: 134-5.

Anemones do well on the Moroccan littoral on deep, light, fresh soils well supplied with humus. Sowing occurs in September–October and flowers appear in January–April; 4–500 pea-size corms per sq. m. are produced. These are planted in September at 0.4 × 0.4 m. spacing and 5 cm. depth, after steeping in warm water for 24 hours, and the first shoots appear after 15–20 days. 1–2 applications of Ca nitrate at 20 g. per sq. m. are given before flowering. Each plant should produce 50–100 marketable flowers which are harvested before opening by pulling not cutting.

1021. SCHMIDT, E.

Die Mehltaubekämpfung auf Lorraine-Begonien. (Mildew control in Lorraine begonias.)

Schweiz. Gärtnerztg, 1952, Vol. 55, No. 3, p. 3, illus.

Experiments [particulars not stated] showed that 2% of a sulphur preparation (Ultraschwefel Geigy) + 0.1% of a spreader (Etilon) gave good control of mildew and thrips in begonias.

1022. ALLEN, M. W., AND RASKI, D. J.

Soil fumigation to control root-lesion nematode, *Pratylenchus* sp., in tuberous begonia.

Plant Dis. Repr., 1952, 36: 201-2.

Experiments have shown that, although an entirely satisfactory improvement in plant growth can be obtained by fumigation with DD or CBP (chlorobromopropene), the tubers may still carry a fairly high percentage of nematode infection, and would undoubtedly be a source of infestation if planted elsewhere.

1023. TOMPKINS, C. M.

Pythium rot of pink and yellow calla corms and its control.

Hilgardia, 1950, 20: 183-90, illus. [received 1952].

Pythium ultimum has been identified as the organism causing a rot of corms of the pink calla, *Zantedeschia*

rehmannii, and the yellow calla, *Z. elliottiana*. A description is given of the external and internal symptoms of the disease which is prevalent in the Santa Cruz region of California at harvest time and during storage. Environmental factors favouring infection are indicated. The disease can be controlled by avoiding mechanical injury to corms during harvest, prompt cleaning, excising diseased tissue, dusting cut and exposed surfaces with a mixture of Spergon and Celite 505, and by storing corms in well-ventilated bulb trays at 50° F. or less.

1024. TOMPKINS, C. M., AND SEVERIN, H. H. P.

Spotted wilt of white, yellow, and pink callas.

Hilgardia, 1950, 20: 207-32, bibl. 26, illus. [received 1952].

Spotted wilt is a destructive virus disease widespread in parts of California in field plantings of the white calla, *Zantedeschia aethiopica*, the yellow calla, *Z. elliottiana*, and the pink calla, *Z. rehmannii*. The symptoms of the disease, which are essentially alike on the 3 species, are described in detail with the aid of clear photographs. The virus was transmitted mechanically to healthy seedlings and its perpetuation in rhizomes, corms and offsets was demonstrated. Tests on seed transmission gave negative results. Systematic roguing for 3 successive seasons in a field of white callas reduced the incidence of the disease from 30% to less than 5%, but this method does not appear to offer a practical solution. Roguing could, however, be practised with advantage if healthy stocks, propagated initially from seed, were established in isolated coastal valleys.

1025. GRASSO, V.

Un caso particolare di danno da anidride solforosa. (A case of damage by sulphur dioxide.)

Riv. Ortoflorofruttic. ital., 1952, 36: 126-9, bibl. 8, illus.

A case of damage by sulphur dioxide to *Zantedeschia aethiopica* and other flower plants in a greenhouse is described. Contrary to general experience the leaves had suffered more than the flowers. This is held to be due to the fact that at the time of fumigation the plants were in full physiological activity with the stomata open to their widest extent.—Florence University.

1026.* WELLENSIEK, S. J.

The breeding of cyclamens.

[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 12.

The author's collection of cyclamen species at Wageningen has been listed and their chromosome numbers noted. Some of them may be of direct value for breeding, while the wild *C. persicum* is a valuable parent for crossing. Most of the cultivated *C. persicum* varieties are autotetraploids. Methods of improving breeding methods are discussed. [From author's summary.]

1027. PARDATSCHER, G.

Protoplasmatische Studien an Blütenzellen von *Dahlia*. (Studies on the protoplasm of dahlia flower cells.)

Portugal. Acta biol., Ser. A, 1951, 3: 171-86, bibl. 14, illus.

The following observation is of interest to horticultur-

* See note, p. 3.

ists: A frost of -2°C . in October killed all the dahlia leaves but only partially injured the flowers. The author also found that the osmotic values of frozen cells are considerably higher than those of normal cells.—Vienna University.

1028. KOSUGI, K.

On the development of flower bud and corm in gladiolus. [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1952, 20: 231-7, bibl. 21, illus.

Gladiolus, variety Kunder'd White, planted at the end of March or in mid-April, formed blossom primordia at the time when, or just before, the second normal leaf appeared early in May. About 1 month later pollen and ovule formation began. Ten days after this some of the topmost flower buds on a spike stopped growing, while the remaining buds continued developing and started flowering 9 days later. New corms developed rapidly as the flowers faded and continued growing until the end of September or early October. Corms from axial buds started growth later than central corms and continued growing until mid-October. Cormel growth continued until November.

1029. MAGIE, R. O.

Limitations of resistance to gladiolus fusarium disease.

Gladiol. Mag., 1951, 15 (4): 2, 36-8, from abstr. in *Rev. appl. Mycol.*, 1952, 31: 435.

Some of the most resistant gladiolus varieties, such as Maid of Orleans, Margaret Fulton, and Elizabeth the Queen, occasionally develop *Fusarium* corm rot (*F. oxysporum* [f. *gladioli*]). Moreover, the roots or leaf bases are often susceptible to infection when the corm is resistant. In warmer areas new stock may be considered healthy if no disease appears either in the field or in storage after growing in a limited area for two or three years.

1030. WINTERS, H. F.

Daylily variety trials in Puerto Rico.

Nat. hort. Mag., 1952, 31: 180-5, illus.

Sixty-seven varieties of daylily, *Hemerocallis* spp., have been under trial in Puerto Rico. Twenty-eight were successful at elevations above 1,000 ft. and some of them might succeed at lower elevations. Sixteen varieties were particularly unsatisfactory. A tendency to produce aerial plantlets on the flower scape was especially pronounced in 11 varieties.

1031.* WASSINK, E. C., AND WASSINK-VAN LUMMEL, L. E. A. E.

The action of light intensity and night temperature on flowering of bulbous irises (Wedgewood) and tulips.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 5, bibl. 3.

Experiments are described concerning the influence of light intensity and night temperature on flowering of iris, var. Wedgewood. In some cases it was possible to establish a definite light intensity level (2,000 lux, 14h per day) below which the plants do not flower. Flowering was found to occur at a negative dry weight balance. So far, no definite influence has been found of night temperature on the above mentioned level, but possibly

the intensity intervals used were not sufficiently small for this purpose. High night temperatures accelerated development strongly, but had an unfavourable influence on the dry weight balance. In an experiment made later in the season, flowering occurred at much lower light intensities. The dry weight balance was much the same as before. The bulb seemed able to divert more energy into flower development than in the earlier experiment. Chlorophyll content also showed definite relations to light intensity and, to a lesser degree, also to night temperature. [From authors' summary.]

1032. STUART, N. W., AND GOULD, C. J.

Curing and forcing Wedgewood iris.

Flor. Exch., 1952, 119 (14): 16, 55-6.

During 1951, heat cured bulbs again produced the earliest flowers [see also *H.A.*, 21: 882], and no additional benefit was obtained when a 20-day curing period was used instead of the earlier recommended 10-day period. It is recommended that the bulbs should be dug at regular times, dried in the field and subjected to treatment without delay. For early forcing only large bulbs, cured (10 days at 90°F .) and precooled (6 weeks at 50°F .), should be used, and they should be planted within 5 days of treatment under cool conditions in soil of average fertility at least 4 in. deep at a distance of 3×3 in. The temperature during cloudy weather should be lowered and good ventilation provided during the whole forcing period.

1033. BREAKEY, E. P., AND GOULD, C. J.

Wireworm control on Wedgewood iris.

J. econ. Ent., 1952, 45: 538, being *Sci. Pap. Wash. agric. Exp. Stats* 1102.

Dips containing thiuram plus BHC, BHC alone and thiuram plus dieldrin gave the best protection of iris bulbs from wireworm attack.

1034. MYODO, H.

The cultivation of bulbs for export in Hokkaido. III. On the pollen tube development and growth of the Easter lily (*Lilium longiflorum*). [Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1951, 20: 37-43, bibl. 9, illus.

The optimum temperature for pollen tube development in the Easter lily is about 30°C . At 11°C . germination did not occur, while at 40°C . the grains often germinated rapidly but the pollen tubes made little growth. The optimum sugar concentration for pollen tube development was about 8%, though some germination occurred within the range of 2 to 16%. Pollen germination on the stigma was similar both for self- and cross-pollination, but the growth of pollen tubes in the stylar cavity was much slower in the former case.

1035. KOSUGI, K.

On flower bud differentiation in Easter lilies.

[Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1952, 21: 59-62, bibl. 6, illus.

In experiments at Yokohama the first primordia began to show on 12 March and by 22 March 35% of the bulbs showed 2 primordia. Differentiation of the various floral parts took place as follows: outer petals—31 March, inner petals and stamens—10 April, pistils

* See note, p. 3.

—20 April, pollen and ovules—20 May. Flowering began on 18 June.

1036.* STUART, N. W.

Effects of storage temperatures on the forcing responses of Easter lily and bulbous iris.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 8, bibl. 14.

Maximum acceleration in blooming of Easter lily bulbs grown in the southern United States is obtained by storing the bulbs at temperatures of 7.2° and 10° C., for 5 to 6 weeks. Longer storage at these temperatures results in sprouting and rooting of the bulb and the production of fewer leaves and flowers per plant. Longer storage of the bulbs for later blooming is accomplished best by use of a low temperature (−0.5° C.) and prevention of desiccation by lining the bulb containers with water-impervious plastic sheets. As the storage period lengthens, blooming takes place in fewer days and the number of flowers per plant is reduced. Earliest blooming of bulbous iris of the Wedgewood variety grown in Northwestern United States results when the mature bulbs are cured at 29.4° to 35.0° C. for 10 days immediately after harvest followed by storage at 10.0° C. for 6 weeks before planting. [Author's summary.]

1037. HUME, E. P.

Forcing the coral lily.

Flor. Exch., 1952, 118(10): 16.

Trials at the Vermont Experiment Station have shown that the coral lily, *Lilium tenuifolium*, needs a short cold period to complete its dormancy. The majority of bulbs lifted in August and stored at 31–36° F. for 20 to 30 days flowered in 8 to 12 weeks in a 60° F. greenhouse. Similar bulbs held at room temperature for 100 days failed to grow in 5 months.

1038. EASTWOOD, T.

Forcing Creole lilies at different levels of soil nitrate.

Proc. Amer. Soc. hort. Sci., 1952, 59: 531–41, bibl. 3.

Three experiments are reported, the results of which suggest that low concentrations of soil nitrate ranging from 2 to 10 p.p.m. (expressed as Spurway values) produce a better Creole lily plant with a greater yield of better quality flowers than do high levels of nitrate in the range 50 to 80 p.p.m. Quality appears to deteriorate at levels above 15 to 20 p.p.m.

1039. STRUCKMEYER, B. E., AND BECK, G. E.

The effect of maleic hydrazide on the growth and flowering of Croft Easter lilies.

Proc. Amer. Soc. hort. Sci., 1952, 59: 542–8, bibl. 5, illus.

Plants of Croft lily, *Lilium longiflorum*, were sprayed once or twice at 4 stages of growth with the diethanolamine salt of maleic hydrazide (1,2-dihydrophydazine-3,6-dione) at concentrations of 0.025, 0.05, 0.1, 0.2 and 1% and higher. Growth in height was decreasingly less as the concentration increased, the effect being most marked on young plants. Delay in blossoming increased with increase in concentration and decreased with the age of the plant. One application at 0.025% produced 5%, and 2 applications over 50%, abnormal flowers.

* See note, p. 3.

Growth was almost completely inhibited and blossom bud development completely inhibited at concentrations above 0.1%.—Univ. Wis.

1040. CARRA, P.

Travaux sur narcisses entrepris au jardin d'essai du Hamma. (Work on narcissi at Hamma experimental garden.)

Rev. hort. Algér., 1952, 56: 202–6.

Work at Hamma since the war has shown that narcissi are well suited to Algeria for winter flowering and that the natural gap which exists between the flowering period of the cluster varieties (November to the middle or end of January) and of all others (February to March) can be bridged by late planting of the former and by using varieties with a long flowering period.

1041. WYLIE, A. P.

The history of the garden narcissi.

Heredity, 1952, 6: 137–56, bibl. 46, illus.

“The object of the present study is to discover how far the study of chromosomes and a knowledge of hybridization and documentary history can be used to reveal the origin and means of improvement of the garden daffodils.”—John Innes hort. Instn.

1042.* WILSON, G. L.

Recent developments in daffodil breeding, with particular reference to white daffodils.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7.

Despite the 8–12 years necessary to raise a daffodil from seed to full maturity the development of daffodils in the last 20 years has been remarkable. The author deals with more recent developments and discusses the pedigrees of certain varieties which he has found particularly useful in breeding the finest pure whites. He also deals with the so-called pink varieties.

1043. MCCLELLAN, W. D.

Effect of temperature on the severity of fusarium basal rot in narcissus.

Phytopathology, 1952, 42: 407–12, bibl. 6, illus.

In temperature tanks in the greenhouse, rot caused by *Fusarium oxysporum* f. *narcissi* developed most rapidly on inoculated narcissi at 70° F. Symptoms developed more slowly at 60° F. and 65° F., but far more rapidly than at 55°, 50° or 45° F. Optimum growth of non-inoculated plants occurred in soil at temperatures of 55° and 65° F. Late season mulches with leaves, straw, and aluminium foil failed to reduce average soil temperatures enough to reduce severity of basal rot, as measured by yields of healthy bulbs. The relatively low temperatures in one area are believed to account for the lower incidence of basal rot in that area.—Plant Ind. Stat., Beltsville, Maryland.

1044. MINISTRY OF AGRICULTURE, LONDON.

Narcissus pests.

Bull. Minist. Agric. Lond. 51, 4th edition 1952, pp. 36, bibl. 42, illus., 2s. 6d.

This bulletin follows the same lines as the earlier editions, dealing in turn with the large narcissus fly, the small narcissus flies, control of narcissus flies, the stem and bulb eelworm, control of stem and bulb eelworm in the field, the bulb mite, the bulb scale mite, slugs,

* See note, p. 3.

the narcissus bulb and leaf eelworm, the root lesion eelworm and hot water treatment. The layout of the bulletin, however, has been considerably improved and where necessary the information has been brought up to date. The most important changes are the inclusion of advice on the use of BHC and DDT dusts for the control of adult narcissus flies, and the warning against plunging bulbs into cold water immediately after hot water treatment.

1045. FEDER, W. A.

Systox for nematode in daffodils.

Bull. N.Y. St. Flower Grs., 1952, No. 82, pp. 3-4, bibl. 4.

Three applications, at weekly intervals, of the systemic insecticide, Systox, at 20 g. of 32% active material per gal., either as a soil drench or as a leaf spray, markedly reduced the population of *Ditylenchus dipsaci* in both the bulbs and stems of King Alfred daffodils. Treated plants with badly distorted foliage gave rise to normal flowers.—Cornell Univ.

1046. CARRA, P., AND THÉAU, A.

Travaux du jardin d'essai du Hamma sur le *Strelitzia reginae*. (Work on *Strelitzia reginae* at Hamma experimental garden [Algeria].)

Rev. hort. Algér., 1952, 56: 222-34.

Selection work since the war has shown that certain specimens flower more profusely and are earlier or later than others, and that planting should be done in May/June. It seems likely that a relationship exists between vegetative characters and profusion of flowering and that the plants produce more flowers earlier if irrigated in summer.

Lawns.

(See also 612-619, 1089g.)

1047. WATSON, J. R., JR., AND CRAIN, A. W.

The home lawn. Good turf for utility and beauty.

Bull. Tex. agric. Exp. Stat. 747, 1952, pp. 22.

For Texas conditions the warm season grasses recommended for turf are bermuda (*Cynodon dactylon*), St. Augustine (*Stenotaphrum secundatum*) and buffalo (*Buchloe dactyloides*); the cool season turf grasses are ryegrass (*Lolium* spp.), Alta and Kentucky 31 strains of fescue (*Festuca elatior* var. *arundinaceae*) and Kentucky bluegrass (*Poa pratensis*). No combination has so far proved entirely satisfactory for maintaining turf all the year round, but the best results are obtained from overseeding bermuda and St. Augustine with annual ryegrass. Recommendations are made for establishing a new turf, management of established turf, dealing with special problems such as weeds, diseases and pests, and renovating old lawns.

1048. DAWSON, R. B.

The winter management of lawns.

North. Gdnr., 1952, 6: 187-8.

Recommendations are made regarding manuring, liming, top dressing, aeration, worming, weeds and diseases, of lawns in the North of England.

1049. HOWELL, W.

Lolium perenne, S.23 for sports grounds.

Gdnrs' Chron., 1952, 132: 4.

L. perenne, certified Aberystwyth S.23, is the most expensive but probably the most useful of ryegrasses for extensive sports areas. Its suitability for various land is discussed and its characteristics, including germination and growth habit, are described.

1050. HARDING, W. F. W.

Clover lawns.

J. roy. hort. Soc., 1952, 77: 377-80.

It is recommended that under certain circumstances pure lawns should be abandoned and non-grassy elements should be introduced. The two plants most suitable for mixing with grasses are white clover, *Trifolium repens* and yellow suckling clover, *T. dubium*. These will give a dense green turf which will retain a good colour throughout the hottest periods of the summer and will, if necessary, help to cloak the relative unsuitability of certain soils for lawn formation. Yarrow, thyme, camomile and others were also found adaptable for this purpose, but it is pointed out that all non-grassy additions are unsuitable for sports fields. Methods of introducing broad-leaved plants into either newly laid or established lawns, used with success by the Imperial War Graves Commission for a number of years, are described.

Orchids.

1051. MURAKISHI, H. H.

Diamond spot, a new disease of *Spathoglottis* orchids.

Bull. Pacif. Orchid Soc. Hawaii, 1952, 10 (1): 15-16, from abstr. in *Rev. appl. Mycol.*, 1952, 31: 329.

The first visible symptoms of diamond spot, a virus disease, are minute chlorotic spots and streaks on young leaves, followed by irregular, reddish-brown to black spots 1-4 mm. across, alone or in the form of necrotic rings, or diamond-shaped spots, all on the same leaf or on different ones. On older leaves each diamond spot is a central ring surrounded by 1 to 5 larger diamond-shaped rings. Premature leaf-casting occurs in severe cases.

1052. FEDER, W. A.

Transit rot of vanda orchid blossoms.

Phytopathology, 1952, 42: 373-6, bibl. 6, illus., being *Tech. Pap. Hawaii agric. Exp. Stat.* 251.

Rotting of vanda orchid blossoms during shipment was caused by a complex of *Botrytis*, *Gloeosporium*, and *Alternaria* species. Dominance of *Botrytis* was related to prevalent environmental conditions. Successful control was obtained by atomizing the blossoms with various fungicides prior to shipment. [Author's summary.] [See also *H.A.*, 22: 1748.]

Succulents.

(See also 1089q, s.)

1053. RESENDE, F., AND VIANA, M. J.

Succulentes africanas. IX. The role played by the intensity of illumination during the development of the inflorescence of *Bryophyllum daigremontianum* (R. Hamet et Perr.) Berg.

Portugal. Acta biol., Ser. A, 1948, 2: 211-26, bibl. 15, illus. [received 1951].

Experiments with *Bryophyllum daigremontianum* showed that a light intensity above a certain limit (possibly 1,000 f.c.) is necessary both for complete flowering stimulus and for maintaining the development of the inflorescence. In both cases the light stimulus is received by the mature leaves and is transmitted hormonally to the inflorescence, which may be in complete darkness. If the intensity of light is lowered, the inflorescence will return, completely or partially, to the vegetative state. The degree of regression may vary in different regions of the inflorescence if individual leaves receive different degrees of light intensity, after the initial flowering stimulus has been received. The formation of roots by inflorescences which have returned to the vegetative state depends on the degree to which the light intensity is lowered.—Institute of Botany, Lisbon.

1054. RESENDE, F.

Suculentas africanas. X. Auxin and the floral initiation.

Portugal. Acta biol., Ser. A, 1948, 2: 251-3, bibl. 6, illus. [received 1951].

In a series of 3 experiments with *Bryophyllum daigremontianum*, in which some of the plants were placed vertically and some horizontally, there was an average of 72.3% flowering in the vertical plants and 45% in the horizontal plants. In the horizontal plants which did not flower rooting occurred at the point where the stems curved as a result of geotropic action; in the plants that flowered little or no rooting occurred. From this it is deduced that there was competition for auxin between flowering and root formation. The effect of the time of year at which the flowering stimulus is received on the percentage flowering and on the form of the flowers is discussed.—Institute of Botany, Lisbon.

1055. RESENDE, F.

Changing of the ♂ flowers into ♀ flowers by the action of weak light (*Bryophyllum*).

Portugal. Acta biol., Ser. A, 1949, 2: 365-6, bibl. 5, illus. [received 1951].

The relationship is briefly discussed of the auxin/antiauxin ratio in *Bryophyllum daigremontianum* to the inhibition of stamens in the flowers as a result of low light intensity treatment of the buds.—Institute of Botany, Lisbon.

1056. RESENDE, F.

Oscillation of auxin-level during the year and the flowering in *Bryophyllum*.

Portugal. Acta biol., Ser. A, 1949, 2: 373-6, bibl. 15, illus. [received 1951].

Experiments with *Bryophyllum daigremontianum* have shown that the same photoperiodic treatment given at different times of the year induces a different flowering response. It is only when the optimum photoperiod is given during the period August-October that 100% flowering and normal inflorescences are formed. At other times of the year the inflorescences are vegetative to a greater or lesser extent. The size of the flower pedicel, which indicates the auxin level, was found to be proportional to the vegetative character of the inflorescence. It is therefore concluded that the degree of flowering is inversely proportional to the auxin level, and that the auxin level decreases endogenically from spring to autumn.—Institute of Botany, Lisbon.

1057. RESENDE, F.

Contribution to the physiology of development of the inflorescence and of the single flower (*Bryophyllum* and *Kalanchoë*).

Portugal. Acta biol., Ser. A, 1949/51, Vol. R. B. Goldschmidt, pp. 729-84, bibl. 54, illus. [received 1952].

Experiments conducted since 1945 on *Bryophyllum daigremontianum* have shown that low light intensity affects flower initiation and development not directly but by acting on the auxin/antiauxin balance in the vegetative part of the plant. By varying only the light intensity falling on the leaves, every type of inflorescence and flower may be obtained, from the morphologically vegetative to the completely "floral". As the light intensity is increased, the flowers develop first calyx, then pistil, then corolla and finally androecium. This suggests that the calyx is the most vegetative part of the flower, requiring or tolerating the highest concentration of auxin, while the androecium is the most "floral" part. Although a low auxin/antiauxin ratio is required for the initiation and development of the inflorescence, in the inflorescence itself a greater amount of auxin is produced than in the vegetative parts of the plant, and it is this that causes the rapid growth of the floral parts. The internal correlation processes between the different plant organs during floral development are discussed with relation to *B. daigremontianum* and a species of *Kalanchoë* from Mozambique. It is concluded that there are no flowering hormones but that flowering is induced when a certain balance is reached by the hormones present in the plant in the vegetative state. The difference between short- and long-day plants lies in the existence or non-existence of a certain "limit to this hormonal balance".—Institute of Botany, Lisbon.

1058. VIANA, M. J.

On the physiological behaviour of *Bryophyllum daigremontianum* in the absence of light.

Portugal. Acta biol., Ser. A, 1951, 3: 195-210, bibl. 18, illus. [received 1952].

When vegetative plants of *Bryophyllum daigremontianum* were kept in complete darkness, roots formed along the stem. The position of the roots depended on the duration of the darkness. They were first formed at the nodes and on the internodes near the base. After about 36 days roots began to appear on the etiolated internodes near the apex and to a lesser extent at the apical nodes. The number of roots formed increased with the duration of the dark treatment up to about 80 days. Branch formation also occurred, but always after the formation of roots. After 119 days of darkness, branches were observed on about 58% of the plants. Bulbils did not form on the leaves of plants kept in the dark but when the dark-treated plants were returned to the light bulbils formed on the new leaves which were formed in the light. These facts are interpreted in the light of auxin movement.—Institute of Botany, Lisbon.

1059. ESTEVES-DE-SOUSA, A.

The action of synthetic auxin and synthetic antiauxin in the flowering of *Kalanchoë rotundifolia* Haw.—1.

Portugal. Acta biol., Ser. A, 1950, 3: 91-108, bibl. 24, illus. [received 1952].

In this paper the author admits that the floral impulse may be determined by a certain value of the auxinic ratio $\frac{\text{auxin}}{\text{antiauxin}} = \delta$. He reports his experiments with *K. rotundifolia*, treated with synthetic hormones and with or without photoperiodical induction, in an endeavour to determine whether flowering may be forced or delayed, independently of the endonomic annual rhythm, by altering the auxinic ratio. He came to the conclusion that *K. rotundifolia* is a short-day, antiauxin-plant, and, although the flowering could be forced or delayed, in relation to the controls, the endonomic annual rhythm has greater influence than any of the treatments, even forcing the plants to flower again if they had flowered once before. [From author's summary.]—Institute of Botany, Lisbon.

1060. ROODENBURG, J. W. M.
Flower formation of *Crassula rubicunda*.
Gdnrs' Chron., 1952, 132: 64, illus.

From experiments conducted in Holland it appears that the most suitable winter temperature for *Crassula coccinea* var. *compacta* is about 10° C. (50° F.). In *C. rubicunda*, kept under the same conditions, flower formation the following spring was imperfect, indicating that this *Crassula* needs a still lower temperature. Flowering of both species overwintered at 15° C. (59° F.) was a complete failure.

Roses.

(See also 1089e, j, l, w, 1090c, i.)

1061. CARRIER, L. E.
Low temperature tolerance of rose plant portions as influenced by their diameter and position in the plant.
Proc. Amer. Soc. hort. Sci., 1952, 59: 501-8, bibl. 5.

Controlled low temperature studies on *Rosa multiflora* seedlings and on the hybrid tea rose Frau Karl Druschki budded on *R. multiflora* showed that there were marked variations in frost resistance between different parts of the plant both above and below the ground. The multiflora seedlings also varied significantly from one another. On budded plants the union was more susceptible to low temperatures than any other above-ground parts.—Cornell Univ.

1062. KOHL, H. C., AND POST, K.
Time for production of roses as influenced by season and method of cutting.
Proc. Amer. Soc. hort. Sci., 1952, 59: 527-30, bibl. 1.

Ten thousand individual shoot records were taken of rose shoots cut in five different ways to find if variation existed in the length of time necessary to mature a flower following the various cutting methods. In general, the greater the distance the cut was made from the base of that shoot, the shorter was the time required for the following shoot to flower. The time required to mature a flower was greater in fall and winter than in spring and summer. Variation between different shoots in the time necessary to mature a flower was greater in the winter than at other times. Variation in the total maturation period at all times was caused primarily by variation in the early stages of shoot development. [Authors' summary; see also 1089w.]—Cornell Univ.

1063. SIEGELMAN, H. W.
The respiration of rose and gardenia flowers.
Proc. Amer. Soc. hort. Sci., 1952, 59: 496-500, bibl. 4, illus.

Roses and gardenias, without stems in a humid atmosphere, were subjected to temperatures of 5, 15, and 25° C. and their carbon dioxide output measured. The time course of respiration was very similar for the two flowers at 5° and 15° but not 25° C. Long storage life was a function of low storage temperature. [Author's summary. The apparatus used is illustrated diagrammatically.]—Univ. Calif.

1064. LYLE, E. W.
Control of molds on rose bushes in cold storage.

Down to Earth, 1952, 8 (2): 12, illus.

Common mould fungi such as *Penicillium*, *Botrytis*, *Rhizopus*, etc., are frequent saprophytes under conditions of high humidity in cold storage vaults for dormant rose bushes. They may grow on the walls (particularly if of wood) and various packing materials, and may spread or even originate on the living plants. In experiments for the control of moulds in refrigerated rose bush storage (temperature about 32° F.) it was found that DHA-S (sodium salt of dehydro-acetic acid) was safe and effective at 1:100. A spreader improved its wetting and killing of the mould.

Other trees and shrubs.

(See also 42, 1089a, c, h, m, n, p, y, 1090a, h.)

1065. GRISVARD, P.
Les arbres d'ombrage de la région parisienne.
(Shade trees of the Paris region.)
Jardins Fr., 1952, 6: 175-83, bibl. 1, illus.

The main problems associated with the maintenance of healthy trees in city streets are air pollution, lack of light, unsuitable soil and subsoil with insufficient moisture and aeration, and lack of resistance to pests and diseases. These problems are discussed with special reference to the measures used for overcoming them in Paris. The relative importance is indicated of the various species grown since the beginning of the century; ailanthus, sycamore and elm have almost disappeared whereas sophora and plane are on the increase.

- 1066.* WYMAN, D.
The propagation and registration of woody plants in the United States.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7, bibl. 9.

The propagation of woody plants is being studied by an ever increasing number of workers in America. Asexual propagation is the most important method and the plant patent law stipulates that the only plants which can be patented are plants increased by asexual methods. A co-operative attempt is being made with regard to the registration of new plants by the American Association of Nurserymen, the American Rose Society and others. Registration is certainly a step in the right direction, but registration without proper identification means little. It is hoped that the registration of new plants can be continued and enlarged to include proper identification and certification. The pomologists and some commercial growers are pointing the way. A

* See note, p. 3.

similarly co-operative arrangement might be worked out by several of the national horticultural organizations in the United States which would result in some over-all means of proper identification of new plants, as well as the proper certification of all commercially grown woody plants. [From author's summary.]

1067.* DE BOER, S.

Some aspects of propagation by cuttings of ornamental trees and shrubs.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 2.

Root formation is dependent on many factors. Thus the exact stage reached by the shoot, which itself depends on both internal and external conditions, is most important. Purely vegetative shoots and shoots carrying flower buds give different results. In preparing shoots for use the removal of the top or the base or wounding may affect results. Hormones in powder or liquid form mainly hasten and stimulate root formation. It is necessary to test every species, variety or hybrid for the best hormone and its optimum concentration. Peat, sand or mixtures of the two used as media have different effects. In most cases more peat than sand is best. Examples are given from the Boskoop Nursery Research Station.

1068. WELLS, J. S.

Pointers on propagation. Preparing cuttings for machine planting.

Amer. Nurserym., 1952, 96 (5): 13, 40, illus.

Cuttings of taxus and similar evergreens taken in November-December, treated with hormones and given optimum conditions of humidification and bottom heat began to root in 3-4 weeks. By the middle of April the plants were well established in the cutting benches, were hardened off and had a tough fibrous root system ideally suited for planting by machine.

1069. PRIDHAM, A. M. S.

Preliminary report on defoliation of nursery stock by chemical means.

Proc. Amer. Soc. hort. Sci., 1952, 59: 475-8, bibl. 3.

Defoliation of nursery stock by chemical means.

Proc. 6th annu. Mtg N.E. Weed Control Conf. 1952, New York, pp. 275-81.

Preliminary tests on various shrub species suggest that spraying with 0.3% M.E. 3000 (disodium 3,6-endox-hexahydrophthalate) or 4% Nacconol N.R. provides a practical means of defoliating nursery stock in the field prior to digging. Sprays of ammonium thiocyanate at 3% and potassium cyanate at 2% and calcium cyanamide dust resulted in higher mortality than did hand defoliation. The application of defoliant at a temperature of over 60° F. appeared generally to be most satisfactory.—Cornell Univ. [see also *H.A.*, 21: 3898].

1070. CHANDLER, W. H., AND CORNELL, R. D.

Pruning ornamental trees, shrubs and vines.

Circ. Calif. agric. Ext. Serv. 183, 1952, pp. 44, illus.

Following an account of the principles involved in pruning deciduous and evergreen woody ornamentals including conifers, sections are devoted to pruning methods, training young trees, pruning to control size,

pruning columnar trees, pruning shrubs and pruning vines. A variety index is appended of plants discussed in the text.

1071. WYSONG, N.

Treating tree wounds.

Amer. Nurserym., 1952, 96 (4): 10, illus.

Earlier claims that bark wounds could be healed successfully by the application of shade while the wound was still moist were confirmed by further observations on ash, linden [lime] and elm. In the case of the elm, 2 wounds on the trunk were shaded with burlap, free circulation of air being allowed round one and impeded round the other. The latter developed new bark directly over whole surface within 9 months, except in areas where the cambium had been destroyed, while the former developed callus round the sides of the wound in the normal way and healed much more slowly.

1072. NEISWANDER, R. B.

Control of mites on woody ornamental plants.

J. econ. Ent., 1952, 45: 373-6, bibl. 2.

Among the new acaricides effective against the spruce mite, *Paratetranychus ununguis*, on juniper, spruce and arbor-vitae p-chlorophenyl p-chlorobenzene sulphonate was found to possess outstandingly good residual action. A 10% dust applied by aeroplane during May prevented damage throughout the summer. A trialkyl thiophosphate and Compound 4049 also appeared very effective. Against the cyclamen mite, *Tarsonemus pallidus*, on azaleas, of the 4 acaricides tested only Compound 923 was effective, and against *Vasates atlantazaleae*, a species not recorded previously in Ohio on azaleas, Compound 4049 gave satisfactory results.

1073. MATTHYSSE, J. G., AND NAEGELE, J. A.

Control of several tree and shrub leaf miners.

J. econ. Ent., 1952, 45: 377-83, bibl. 12.

Ten tables are presented showing the efficacy of a number of the newer insecticides against larval miners within the leaves of birch, elm, holly, boxwood and arbor-vitae.

1074. MATTHYSSE, J. G., AND NAEGELE, J. A.

Spruce mite and southern red mite control experiments.

J. econ. Ent., 1952, 45: 383-7, bibl. 1.

Azalea and holly were treated at Cornell University for control of southern red mite, *Paratetranychus ilicis*, and spruce for control of spruce mite, *P. ununguis*. Of the chemicals tested TM-1(di p-chlorophenyl methylcarbinol) produced high mortality of both mites within a day of application and its residual activity in most cases was sufficient to prevent population build-up for more than a month. TM-2(p-chlorophenyl p-chlorobenzene sulphonate), while somewhat slow at first, gave the longest residual action, a single application controlling both spruce and southern red mites for a whole season. Limited trials with EPN were very promising. Systox was found a rapid killer but was very variable in residual effectiveness and is to be further tested.

1075. LEE, F. P., AND OTHERS.

The azalea handbook.

Nat. hort. Mag., 1952, Vol. 31, Special No., pp. 148, bibl. 7, illus.

* See note, p. 3.

This handbook, published by the American Horticultural Society, is intended for "the serious amateur" rather than the nurseryman or scientist. In a series of 12 finely illustrated articles, much scientific knowledge on the botany and outdoor culture of azaleas is summarized in a readable form. In the editorial it is stated that "much of the data found here has never been in print before". The articles deal with taxonomy, plant habit and longevity, azalea flowers and leaves, azaleas for the garden (an extensive descriptive list of species, varieties and hybrids, together with a list of azalea nurserymen in different parts of the world), satisfactory azaleas for various regions in the U.S., growth factors, soils and mulches, cultural directions, pests and diseases and their control, propagation, and hybridizing by the amateur.

1076.* DE GROOTE, R.

The growth and flowering reactions of *Azalea indica* in inorganic culture medium. [Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 3.

A plea for, and a brief account of, the successful cultivation of azaleas in vermiculite sub-irrigation culture in Belgium. [See also next abstract.]

1077. CORTVRIENDT, S. F., AND DE GROOTE, R.

Die Treiberei von einigen Sorten Azaleen in einem Vermiculite Substrat nach der Methode der unterirdischen Bewässerung. (The forcing of some azalea varieties in subirrigated vermiculite.)

Schweiz. Gärtnerztg, 1952, Vol. 55, No. 9, pp. 2, illus.

In February, 1951, two- and one-year-old azaleas were planted in vermiculite and subirrigated according to a system which is described and illustrated. With the exception of Petrick Alba, all the varieties tested developed larger flowers in soilless culture and very considerably exceeded the flowering period of the controls. The plants thrived also in vermiculite pot cultures. Applications of nutrient solution after flowering promoted the development of new rootlets. The performance of two-year-old plants was superior to that of one-year-old.—Stat. Rech. État Amél. Plantes ornement., Ghent, Belgium.

1078. (KOLESNIKOV, L. A.)

Hundreds of new lilac varieties. [Russian.] Priroda, 1952, No. 4, pp. 82-5, illus.

An account is given of Kolesnikov's method of lilac breeding. To overcome the difficulty of pollinating double flowered lilacs, the stamens and pistils of which are underdeveloped, the bushes are transplanted into poor soils, and their roots are pruned. As a result double flowering is reduced and the stamens become more easily accessible. To hasten the propagation of the new varieties the seedlings are grown on a single stem, produce flowers in their 4th year and are then either budded or grafted. Experiments have shown that the best plants are produced by working varieties on tested seedlings of *Syringa vulgaris* and [*Syringa*] "vengerskaja". At present there are 578 different lilacs in the author's collection in the Moscow region. The outstanding characteristics of a few of the most promising new varieties are very briefly described.

* See note, p. 3.

1079. NIKOLIĆ, V.

Viroza na jorgovanu. (A virus disease of lilac.) [English summary 6 lines.] Zashit Bilja, Belgrade, 1951, No. 3, pp. 71-2, bibl. 2, illus.

A virus disease of lilacs, similar in its symptoms to that described as ringspot in Bulgaria is reported for Yugoslavia for the first time.

1080. VAN MARLE, G. S.

Bladrollers in seringen. (Leaf-rollers on lilacs.) [English summary 1/4 p.] Tijdschr. PlZiekt., 1952, 58: 191-6.

Larvae of *Adoxophyes orana* have been found in inflorescences of lilac (*Syringa vulgaris*). The direct damage is insignificant but the presence of the pest raises difficulties in connexion with the export of lilac blooms from Holland to the U.S.A., and its control is desirable; this can be effected by fumigating the flowers before shipment with 20 c.c. per m³ of methyl bromide for 2 hrs. at 70° F.

1081. TOKUSHIGE, Y.

Witches'-broom of *Paulownia tomentosa* L. J. Fac. Agric. Kyushu Univ., 1951, 10(1): 45-7, from abstr. in Rev. appl. Mycol., 1952, 31: 359.

A severe witches' broom of *Paulownia tomentosa* is gradually spreading from the southern regions of Japan and Korea to other districts. The incessant sprouting of the axillary buds from spring to late autumn gives rise to the characteristic witches' brooms. One- to two-year-old trees which become infected may die during the current or the next season, while older ones suffer great loss of vigour and do not survive more than a few years. The author's experiments indicate that the disease is caused by a graft-transmissible virus.

1082. MILANO, V. A.

Nueva variedad horticola de *Pinus patula*. (A new horticultural variety of *Pinus patula*.) [English summary 3 lines.] Lilloa, 1949, 17: 145-6, illus. [received 1952].

A mutation of *Pinus patula* with variegated yellow and green needles appeared in a nursery in the province of Buenos Aires. The name *P. patula* var. *kebrina* is proposed. The variety is described and illustrated.

1083. VAGLIASINDI, G.

La stella di Natale. (The Christmas flower [*Poinsettia pulcherrima*].) Ital. agric., 1952, 89: 369-78, illus.

The limiting factors in the commercial cultivation of *Poinsettia pulcherrima* in Italy are cold, damp soils and high winds. Windbreaks 6-8 m. high and 45 m. apart, chiefly of *Ficus retusa*, are employed. Propagation is by rooted cuttings 15-40 cm. long raised in pots or nursery beds. Planting out occurs in February at a spacing of 1.5-1.75 m. and subsequent cultural operations are: March, hoeing; April-May, a heavy pruning which consists of cutting back the stumps of the previous year's flower branches to 15-20 cm. above the point of branching and which provides the cuttings for the next year's planting; April and May, replacement of failures. In Valdisavoia the shrubs produce marketable flowers in their first year in the plantation. In the Catania district they yield 12-50 flower branches from their 4th year until the end of the rotation at about 20 years.

1084. SHANKS, J. B., AND LINK, C. B.

Poinsettia stock plant nutrition in relation to production, rooting, and growth of cuttings.
Proc. Amer. Soc. hort. Sci., 1952, **59**: 487-95,
bibl. 4, being *Sci. Pap. Md agric. Exp. Stat.*,
Dep. Hort., A342.

Poinsettia stock plants, variety Oak Leaf, used for production of cuttings received 3 levels each of N, P and K in all possible combinations. The cuttings made were rooted in sand and the resultant plants grown with uniform treatment until in bloom. In general the stock plants receiving high N and medium P and K gave the best results. All three elements significantly affected the number of terminal cuttings produced and the date of bloom. N and P also affected the degree of rooting of terminal cuttings, the number of blooming plants per stock plant and the number of flowers on plants from a single stock plant. Differences between terminal and leaf-bud cuttings taken on different dates are also indicated.

1085. KOFRANEK, A. M.

Some effects of low soil temperatures upon the growth of *Euphorbia pulcherrima*.
Proc. Amer. Soc. hort. Sci., 1952, **59**: 509-13,
bibl. 5, illus.

Poinsettia plants suffered severe wilting followed by leaf and bract abscission when subjected continuously to a soil temperature of 40° F. for 2 or 6 days, the longer period having the more pronounced effect. Stem sections, however, showed no apparent injury to conducting tissue. Plants kept at soil temperatures of 60° F. by day and 40° F. by night or at higher temperatures throughout showed no wilting and relatively little abscission. The apparatus used is illustrated diagrammatically.—Cornell Univ.

1086. BLUMER, S.

Über zwei Schimmelpilze auf den Blütenständen von *Poinsettia pulcherrima* Willd. (Two moulds on inflorescences of *Poinsettia pulcherrima*.) [English summary 6 lines.]
Phytopath. Z., 1952, **19**: 417-22, bibl. 7, illus.
Schimmelpilze auf den Blütenständen von *Poinsettia*. (Moulds on poinsettia inflorescences.)
Landw. Jb. Schweiz, 1952, **66**: 619-20, illus.

The symptoms of infection of the inflorescences of *Poinsettia pulcherrima* by *Botrytis cinerea* and *Penicillium stoloniferum* are described. The blossoming of the plants is delayed by low temperatures, and, in relation to the number of inflorescences in full bloom, botrytis attacks are much heavier at 14° C. than at 20° C.—Wädenswil, Switzerland [see also *Schweizer Garten*, 1950, **20**: 371-3].

1087. GALLUCCI, M. M.

Un'infezione da *Monilia fructigena* Pers. su drupe di *Prunus laurocerasus* L. (A case of *Monilia fructigena* on the fruits of *Prunus laurocerasus*.) [English summary 6 lines.]
Ann. Sper. agrar., 1952, **6**: 1399-404,
bibl. 13, illus.

This is believed to be the first recorded case of brown rot on cherry laurel fruits in Europe. Macroscopic and microscopic descriptions of the fungus are given.—Phytopath. Exp. Lab., Turin.

1088. PUSHKARNATH.

***Solanum jasminoides* virus.**
Curr. Sci., 1952, **21**: 249.

A new virus has been found in all plants examined of the ornamental climbing shrub, *S. jasminoides*, at Patna. This species never sets seed in the area [and is therefore presumably propagated vegetatively]. The disease has been transmitted by inoculation to several plants, including tobacco, tomato and petunia.

Noted.

1089.

a* ABERCONWAY, LORD.

Rhododendrons and their hybrids.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 3.

b

BASTELEUS, R.

La vie souterraine des plantes bulbeuses. (The underground development of bulbous plants.)

Bull. hort., Liège, 1952, **7**: 262-7, illus.
Tulip, hyacinth, gladiolus, crocus.

c

BEAUMONT, A.

Diseases of lilacs.

Gdnrs' Chron., 1952, **132**: 184-5.

d

BEAUMONT, A.

Diseases of paeonies.

Gdnrs' Chron., 1952, **132**: 24.

e

BLACKMON, G. H., AND MCFADDEN, S. E.
Rose culture in Florida.

Proc. Fla. St. hort. Soc. for 1951, pp. 215-18.

f

BUELL, K. M.

Developmental morphology in *Dianthus*. II. Starch accumulation in ovule and seed.

Amer. J. Bot., 1952, **39**: 458-67, bibl. 13, illus.

g

CHESSMORE, R. A.

Lawns for town and country.

Forage Crops Leafl. Okla agric. Exp. Stat. **10**, 1952, pp. 4.

Lawn establishment, maintenance, pests and grasses for Oklahoma.

h

CHEVALIER, C.

Les beaux cerisiers à fleurs du Japon. (The Japanese flowering cherries.)

Bull. hort., Liège, 1952, **7**: 258-61, illus.
A review with special reference to *Prunus serrulata* and its varieties.

i

CLEMO, G. R., AND FELTON, D. G. I.

Tazettine from snowdrop leaves.

Chem. Ind. Lond., 1952, pp. 807-8, bibl. 6.
Tazettine, the alkaloid previously isolated from *Narcissus tazetta*, has now been found in *Galanthus nivalis*.

j

DEBUSSON, J.

Les sujets porte-greffes pour rosiers. (Rose rootstocks.)

Bull. hort., Liège, 1952, **7**: 104-11, bibl. 5.

* See note, p. 3.

- k DICKEY, R. D.
Factors affecting the keeping quality of cut flowers.
Proc. Fla St. hort. Soc. for 1950, pp. 203-6, bibl. 7 [received Nov. 1952].
A review.
- l* DROUINEAU, C., GOUNY, P., AND MAZOYER, R.
Les conditions de milieu et la nutrition de la plante dans les cultures sur sable et dans le sol. (Environmental conditions and plant nutrition in sand and soil culture.) [English summary 9 lines.]
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7, bibl. 2.
As affecting carnations and roses.
- m FABRIS, H. A.
Algunas Bignoniáceas cultivadas en la Provincia de Buenos Aires y capital federal. (Some Bignoniaceae cultivated in the province of Buenos Aires.)
Lilloa, 1949, 17: 61-77, bibl. 42 [received 1952].
- n FAROOQ, M.
Bicarpellate flower of *Poinciana pulcherrima* L. (= *Caesalpinia pulcherrima* Sw.).
Sci. and Cult., 1952, 18: 192-3, bibl. 5, illus.
- o FOSLER, G. M.
Single stem culture of snapdragons.
Ill. St. Flor. Ass. Bull., 1951, No. 138, p. 2, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 82, p. 4.
- p GOODWIN, T. W.
The carotenoids of the berries of *Lonicera japonica*.
Biochem. J., 1952, 51: 458-63, bibl. 22.
- q GOWDRIDGE, B. M., AND THODAY, D.
Acid metabolism and respiration in succulent Compositae. III. Further experiments with *Kleinia radicans* Haw.
Ann. Bot. Lond., 1952, 16: 349-72, bibl. 12, illus.
- r HASE, A.
Massenaufreten der Veilchenblattrollmücke (*Dasyneura affinis*) in Berliner Gärten. (Serious infestation of the violet leaf roll midge (*Dasyneura affinis*) in Berlin gardens.)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1952, 4: 104-6, bibl. 7, illus.
- s HIGGINS, V.
The cultivation of cacti and succulent plants.
J. roy. hort. Soc., 1952, 77: 351-60.
- t JOHNSTON, I. M.
Studies in the boraginaceae. XXIII. A survey of the genus *Lithospermum*.
J. Arnold Arbor., 1952, 33: 299-362.
Includes a key and notes on 59 *Lithospermum* species.
- u KAVAJIAN, L. G.
The floral morphology of *Clethra alnifolia* with some notes on *C. acuminata* and *C. arborea*.
Bot. Gaz., 1952, 113: 392-413, bibl. 29, illus., being *Contr. Hull bot. Lab.* 632.
- v KOBEL, F., AND SCHÜTZ, F.
Die Hortensienzüchtungen der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. (New hydrangea varieties bred at Wädenswil horticultural research station.)
Schweiz. Gärtnerztg, 1952, Vol. 55, No. 5, pp. 3½, illus.
- w KOHL, H. C.
Time of year and height of cut influences comeback in roses.
Bull. N.Y. St. Flower Grs, 1952, No. 82, pp. 1-2, illus.
See abstract 1062.
- x LIER, F. G.
A comparison of the three-dimensional shapes of cork cambium and cork cells in the stem of *Pelargonium hortorum* Bailey.
Bull. Torrey bot. Cl., 1952, 79: 312-28, 371-92, bibl. 28, illus.
- y McVAUGH, R.
Suggested phylogeny of *Prunus serotina* and other wide-ranging phylads in North America.
Brittonia, 1952, 7: 317-46, bibl. extensive, maps.
- z MAGIE, R. O.
Breeding gladiolus for disease resistance.
Proc. Fla St. hort. Soc. for 1951, pp. 210-12.
1090.
a MENNINGER, E. A.
Evergreen trees for street planting in warm regions.
Proc. Fla St. hort. Soc. for 1949, pp. 189-96, bibl. 20 [received Nov. 1952].
Species grown in different countries listed.
- b* SIMONET, M.
Nouveaux iris Pogocyclus. (New Pogocyclus irises.)
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 8, bibl. 15.
- c STRYDOM, J. C.
Roses.
Bull. Dep. Agric. S. Afr. 327, 1952, pp. 26, illus., 3d.
See H.A., 22: 2894.
- d SYLVÉN, E.
Några hortikulturellt anmärkningsvärda gallmyggor. (Some gall midges of horticultural plants.) [English summary ½ p.]
Medd. Växtskyddsanst. Stockh. 61, 1952, pp. 12, bibl. 18.
- e VACHEROT, M.
Les *Miltonia*. (Miltonias.)
Rev. hort. suisse, 1952, 25: 335-9, illus.
Descriptions and illustrations of several *Miltonia* spp.

* See note, p. 3.

* See note, p. 3.

- f* DE VILMORIN, R.
La selection des plantes de jardin. (Selection of garden plants.)
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 9.
Examples drawn from ornamentals and a few vegetables.

- g WÄDENSIL.
Die Züchtung neuer Hortensiensorten.
(The breeding of new hydrangeas.)
Landw. Jb. Schweiz, 1952, 66: 581-3, illus.

* See note, p. 3.

- h WEST, E.
Notes on camellia diseases.
Proc. Fla. St. hort. Soc. for 1950, pp. 200-3
[received Nov. 1952].
In Florida.

- i* WYLIE, A. P.
Recent work on the history of the garden roses.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 2.

* See note, p. 3.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 1220c, 1222, 1231, 1232, 1399, 1404.)

- 1091.* GREIG, A. M. W.
The ecological factors affecting the commercial production of certain subtropical fruits in New Zealand.
[Mim. Pap.] 13th int. hort. Congr., London, 1952, pp. 9.

A brief account is given of the cultivation in New Zealand of the tree tomato (*Cyphomandra betacea*), the Chinese gooseberry (*Actinidia chinensis*), and the feijoa (*Feijoa sellowiana*). It is noted that they grow successfully in the Auckland area, which is characterized by freedom from frost of more than a few degrees, by an average of 2,000 hours bright sunshine a year and an annual rainfall of 50 to 60 in. spread evenly at from 3 to 7 inches a month.

1092. OCHSE, J. J., AND REARK, J. B.
The propagation of sub-tropical fruit plants by cuttings, a progress report.
Proc. Fla. St. hort. Soc. for 1950, pp. 248-51, bibl. 18 [received Nov. 1952].

The constant spray method used in full sunshine has given promising results for rooting cuttings of several species, a calcium carbonate medium (a by-product of the green sand method of water softening) proving better than coconut fibre. Recently matured semi-hardwood cuttings with only the bottom one-third of their leaves removed gave the best results. Among the types rooted in 6-8 weeks were Persian lime, Rangpur lime, rough lemon, Collins mango, *Antidesma bunius* and *Myciaria jaboticaba*.

1093. KALYANKAR, G. D., KRISHNASWAMY, P. R., AND SREENIVASAYA, M.
Papyrographic characterisation and estimation of organic acids in plants.
Curr. Sci., 1952, 21: 220-2, bibl. 4.

Several solvent mixtures were compared and that giving the best resolutions used to determine the contents of citric, malic, oxalic, succinic and tartaric acids in fruits of 4 *Citrus* spp., 2 *Phyllanthus* spp., *Averrhoa carambola*, *Morus indica*, *Punica granatum* (an acid variety), *Tamarindus indica*, *Vitis vinifera* and *Zizyphus jujuba*. Results expressed in mg./ml. are tabulated. The highest amount of citric acid occurred in *Citrus limonum*

* See note, p. 3.

which also contained a surprisingly large amount of oxalic acid; *C. decumana*, by contrast, contained only oxalic acid. Most of the acid in the acid pomegranate was citric and in the tamarind tartaric. The two *Phyllanthus* spp. differed markedly in the acids present.

1094. STURROCK, D.
Stem protection of young fruit trees from frost.
Proc. Fla. St. hort. Soc. for 1951, pp. 262-4.

Various types of stem protector that have been wrapped around the stems of young citrus and other trees to protect them from frost are mentioned. Among types tested in recent years are "Sisalcraft" paper cylinders and "Fiberglass" and "Ultralite" sheets. The last of these used as an inner wrap with an outer covering of waterproof Kraft paper has proved most satisfactory for young mango trees of 1 in. diameter or over. Younger trees, without mature wood in the stems, were not protected by stem wrapping.

1095. AVIDOV, Z., AND BEN-HAIM, N.
Observations on pests of subtropical fruit trees in Israel. [Hebrew with English summary 15 pp.]
Ktavim, 1950, Vol. 1, Hebrew pp. 245-86, bibl. 12, illus., English pp. 55-69.

The numbers of injurious species of insects recorded on recently introduced sub-tropical fruit trees in Israel are: avocado 26, guava 20, annona 18, loquat 16, persimmon 15, mango 14, pecan 9, pitanga 9. Severe attacks of the greenhouse thrips, *Heliothrips haemorrhoidalis*, commonly occurring on avocado, mango, guava and persimmon, are described. Persimmons are particularly subject to attack by the black vine thrips, *Retithrips syriacus*, and pitanga and pecan are also subject to injury. Experiments indicate that DDT and BHC are effective substitutes for nicotine for the control of thrips; with serious infestations 2 applications, 3 weeks apart, should be made. Various scale insects and mealy bugs found on avocado, mango, guava, persimmon, sapodilla, annona and passion fruit are mentioned; good control of *Saissetia oleae* on guava was obtained with an oil emulsion. Mediterranean fruit fly, *Ceratitis capitata*, attacks at least 17 fruits including, in descending order of infestation, white sapote, pitanga, guava, avocado, feijoa, mango, persimmon and annona; in control experiments on guava a 5% DDT dust gave the best results in 2 years. Other pests mentioned include hymenopterous insects, beetles, rats and jackals.

1096. DÜRR, H. J. R.

The Argentine ant, *Iridomyrmex humilis* Mayr). I. Its distribution, harmfulness and life cycle. II. Control measures.

Emg S. Afr., 1952, 27: 381-4, 390, 429-31, 442, bibl. 9, illus.

Since its first appearance in South Africa in 1897 or 1898 the ant has become widespread, particularly in the Western Cape Province. The extensive damage done by the ant through direct attacks on fruits and the encouragement of scales and mealybugs is indicated, and the life history of the insect described in some detail. Mercuric chloride, DDT, BHC, parathion, chlordane, dieldrin, toxic syrups, and pyrethrum may be used as repellents or for extermination, trees can be protected by sticky gum bands, and arsenical baits can be used.

Avocados.

(See also 1220n, 1297.)

1097. WINSLOW, M. M.

Avocado variety trials.

Calif. Agric., 1952, 6(7): 9, 13, illus.

Short descriptions are given of the 4 most promising avocado varieties in a variety trial at Riverside, namely, Duke, Emerald and Zutano of the Mexican race and Hass of the Guatemalan race.

1098. RUTHERFORD, D. M.

Original combinations of heavy producing avocado trees.

Calif. Citogr., 1952, 37: 494-5, illus.

A method evolved by a nurseryman for reproducing the stock-scion combination of exceptional avocado trees is described. A seedling is grafted above the seed with a scion graft and below the seed with a section of root from the rootstock. Bottom heat and vermiculite provide suitable conditions for the stock portion of the double graft to unite and develop roots.

1099. GUZMAN, V. L.

Algunos experimentos en el palto, mango y plantano. (Some experiments with avocado, mango and banana.)

Agronomia, Peru, 1951, 16: 53-65, from abstr. in *Fruits d'Outre Mer*, 1952, 7, *Suppl. I.F.A.C.*, 9: 128.

Under the prevailing hot, dry conditions the best method of transplanting avocado pears is to cut the roots 20 cm. away from the plant in such a way as to form an isolated block about a month before lifting. Splice grafting mango and avocado gives a high % of success. From the point of view of transport costs, banana rhizomes cut in 2 are the cheapest planting material (2.5 kg. compared with 5.5 kg. for a whole rhizome and 7.5 for a sucker); they grow more slowly at first but in 2 years catch up with plants from suckers or whole rhizomes.

1100. HARKNESS, R. W.

Weed control studies around young avocado trees.

Proc. Fla St. hort. Soc. for 1950, pp. 251-61 [received Nov. 1952].

Newly planted Booth 8 avocado trees were subjected to various cultural treatments and the growth made in the

first year recorded. Weed suppression proved essential and mowing was inadequate. Bermuda grass planted around the trees proved much more deleterious than the dominant broad leaf plant, bidens. Differences between mulching and clean cultivation by hoeing were less important than differences between good and poor weed control. Bryophyllum planted around the trees provided as good an environment as complete weed control. It would appear that, on the shallow limestone soil in question, the main effect of weeds lies in their competition for water.

1101. RUEHLE, G. D.

A study of diseases of avocado and mango and development of control measures.

A.R. Fla agric. Exp. Stat. 1950/51, p. 251.

Results of a test on Lula avocado showed that Bioquin at $\frac{1}{2}$ lb. per 100 gal. is less effective for the control of avocado scab than tribasic copper sulphate at recommended dosages. The addition of urea to the copper sulphate did not increase its effectiveness; it produced, however, slightly higher yields and more luxuriant foliage. On Booth-8 and Waldin varieties tribasic copper sulphate also gave slightly better control of cercospora spot than did Bioquin.

1102. WOLFENBARGER, D. O.

Dictyospermum scale control on avocados.

Florida Ent., 1951, 34: 54-8, from abstr. in *Fruits d'Outre Mer*, 1952, 7, *Suppl. I.F.A.C.*, 9: 92.

Oil emulsion sprays against *Chrysomphalus dictyospermi* caused serious leaf fall. Parathion wettable powder sprays were tried at 0.24 kg. 25% parathion per 100 l. water, and at 0.12, 0.24 and 0.48 kg. 15% parathion per 100 l. water. The third formulation proved best.

Citrus—varieties, rootstocks and propagation.

(See also 128, 1220c, h, q, r, v.)

1103. GONZÁLEZ SICILIA, E.

Variedades de agrios cultivadas en el Levante Español. (Citrus varieties grown in the Spanish Levant.)

An. Inst. nac. Invest. agron. Madrid, 1952, 1: 297-315.

The characteristics and commercial value are indicated of the chief varieties of mandarin, orange and lemon grown in the Spanish provinces of Castellón de la Plana, Valencia, Alicante and Murcia.

1104. CHILDS, J. F. L., AND HRNCIAR, G.

A method of maintaining viability of citrus seed in storage.

Proc. Fla St. hort. Soc. for 1948, pp. 64-9, bibl. 1 [received Nov. 1952].

Seeds of 29 out of 34 varieties of citrus gave over 90% germination after dipping in a 1% solution of 8-hydroxyquinoline sulphate followed by storage for 6 months at 35° F. in moist sawdust or moss in unsealed containers. In most cases germination after 8 months exceeded 80%. Other surface sterilizing agents which effectively controlled the growth of micro-organisms without injuring viability were Puratized N5E and thiocyno aniline.

1105. CAMERON, J. W., AND SOOST, R. K.
Tree size, yield and fruit characters in old lines and nucellar lines of citrus.
Calif. Citrogr., 1952, 37: 428, 440, 442-4, bibl. 6.

Comparisons between old and nucellar lines, about 35 to 37 years old from seed, of 2 lemon, 1 grapefruit, 1 mandarin and 6 sweet orange varieties have shown the nucellar strains to have made bigger trees in every case and to have yielded substantially more fruit in 9 cases out of 10. Fruit size and shape has been generally similar. Number of seeds has been variable, but with a tendency for nucellar lines to produce fewer seeds than old lines early in their life history. Juice percentages and composition have been similar in nearly all cases. Data on 2 navel oranges show the nucellar lines to have consistently produced smaller navels than their parents. A tendency still exists for nucellar lines to be more thorny than their parents, but except in one case thorniness is now slight. Some of the young lines have not yet entirely outgrown juvenile tendencies towards thick rinds and slightly coarser pulp texture.

1106. CARRANTE, V., AND BÓTTARI, V.
Miglioramento genetico del limone e ricerca di varietà resistenti al "mal secco". (Genetic improvement of the lemon and research on varieties resistant to mal secco disease.)
[English summary $\frac{1}{2}$ p.]
Ann. Sper. agrar., 1952, 6: 323-46.

A description is given of breeding conducted at Acireale Experimental Station between 1945 and 1948 with the object of finding a new variety to replace Monachello, which, though highly resistant to *Deuterophoma tracheiphila* and giving a good economic return, displays poor adaptability to different cultural methods and environmental conditions. The 7 varieties used included Monachello and Femminello which were also crossed with some other citrus species. Conclusions reached were: (1) from hybrid progeny in general it is not difficult to get plants with marked resistance; (2) from the progeny of resistant varieties such as Monachello it should be possible to obtain plants which are not only resistant but have vegetative vigour and productivity superior to their parents; (3) from the nucellar progeny of susceptible varieties such as Femminello resistant plants are only obtainable in cases of mutation; (4) chief attention should be paid to hybrids and nucellar plants of Monachello.

- 1107.* MCALPIN, D. M.
Effects of several citrus rootstocks on tree growth, yield and fruit quality in Victoria, Australia.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 13, bibl. 4.

Figures are given of citrus rootstock trials on 6 acres in the Mildura Irrigation Area in north west Victoria since 1934. The stocks were sweet and sour orange and rough lemon and the varieties Valencia Late and Washington Navel. While trees on sweet orange were the healthiest in 1946, those on rough lemon were badly affected by boron toxicity and 50% of those on sour orange had already died from "bud union decline" carried by *Aphis tavaresi*. In an effort to find a stock tolerant of heavy, wet soils and with good collar rot resistance major trials

have now been planted using Cleopatra mandarin and trifoliate as rootstocks.

1108. WALLACE, A., AND OTHERS.
The rootstock-scion influence on the inorganic composition of citrus.
Proc. Amer. Soc. hort. Sci., 1952, 59: 133-42, bibl. 21.

Analyses for N, P, K, Ca and Mg were made of leaves, fruit and rootlets from citrus trees planted in California in 1929, among which were 5 clonal rootstock species planted separately as cuttings, as seedlings, as self-budded trees and worked with various scion varieties. Analyses were also made of seedlings and grafted cuttings of the 5 rootstocks grown in water culture. The authors summarize their results as follows: The influence of rootstock and scion on the inorganic composition of citrus trees has been characterized in part as follows: (a) Some of the rootstock differences were consistent from one scion species to another; (b) the scion modified the influence of rootstock on the composition of the scion species; (c) some of the rootstock-scion differences on scion composition were reciprocal; (d) some of the rootstock differences were present in the fruit; (e) the composition of very young leaves was somewhat independent of the rootstock; (f) at least for potassium, the scion appeared to influence the composition of the rootlets; (g) the different rootstocks did not all follow a similar nutrient-element balance pattern in that, for example, low potassium did not always mean high calcium nor did low phosphorus always mean high nitrogen; (h) differences obtained for trees grown in the orchard in soil were not similar to those obtained for citrus materials grown in water culture; (i) some of the different effects of rootstock on the inorganic composition of citrus, particularly the potassium differences, may be related to an interaction between rootlet respiration rates and cations adsorbed on soil colloids.

1109. COOPER, W. C., AND GORTON, B. S.
Toxicity and accumulation of chloride salts in citrus on various rootstocks.
Proc. Amer. Soc. hort. Sci., 1952, 59: 143-6, bibl. 3.

One-year-old Shary Red grapefruit trees on 13 rootstocks in Texas were irrigated with saline water or non-saline water for 51 days. Leaf analyses were made for Cl, Na, K, Ca and Mg. Rootstock had a marked effect on the accumulation of chloride, the range being from 10 m.e./100 g. for trees on Rangpur lime to 74 m.e./100 g. for trees on Etrog citron. Cl accumulation was not consistently related to that of any other ion. Increases in Na and Ca occurred but were not directly associated with high Cl accumulation, and in the case of Ca there was a tendency towards an inverse relationship. Toxicity manifestations were closely related to an excess in Cl accumulation over total cation increases. Cl accumulation continued progressively and some tree combinations showing no toxicity after 51 days developed it in succeeding months.

- 1110.* BENTON, R. J.
The significance of *Poncirus trifoliata* for citrus rootstock problems.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 10.

* See note, p. 3.

* See note, p. 3.

Rough lemon, generally used as citrus rootstock in N.S. Wales, is susceptible to *Phytophthora citrophthora* and serious loss is frequent following periods of high soil moisture. Seville orange having failed in N.S. Wales from early time, trials are now in progress with trifoliata. It suffers from scaly butt, but careful selection gives control. Investigations are in progress on the selection of trifoliata strains resistant to phytophthora.

1111. BATCHELOR, L. D., AND BITTERS, W. P.
Two promising rootstocks for citrus in California.

Calif. Citogr., 1952, 37: 390-1, 409-10, bibl. 7, illus.

High quality citrus rootstock.

Calif. Agric., 1952, 6(9): 3-4.

A summary is given of data collected over the past 20 years on the performance of Cleopatra mandarin (known as Ponki in China) as a rootstock and over the past 10 years of trials with the Troyer citrange (navel \times trifoliata orange). Cleopatra mandarin has given as good or better yields than other stocks when used for Washington Navel, Valencia and Satsuma oranges, Marsh grapefruit and Eureka and Lisbon lemons. Fruit quality has been high and the stock has shown tolerance to quick decline and to salinity and greater resistance to gummosis than sweet orange or rough lemon. The Troyer citrange has shown marked promise as a stock for several orange, grapefruit and lemon varieties, except possibly Eureka lemon, both when planted in quick decline areas and in old citrus soils. It is not, however, so tolerant as Cleopatra mandarin of saline conditions.

1112. CHAPOT, H.
La Combava, citrus de la Réunion et de Madagascar. (Combava, a citrus of Réunion and Madagascar.)

Rev. int. Bot. appl., 1952, 32: 377-85, illus.

The combava, sometimes called *Citrus combava* but apparently a close relative of *C. hystrix*, is found in Réunion, Madagascar and Mauritius. It was probably introduced from Réunion into Madagascar where it thrives under very different climatic conditions. It endures moist tropical climates as well as the arid deserts of the south. At Ambovomba this citrus is the only one that grows and produces fruit without irrigation. It is not cultivated by the aborigines, who make no use of it, but it is planted by the creoles who utilize the fruit for processing in various ways. A botanical description of the combava is given, and its systematic position is discussed. It is considered to be a hybrid between *Citrus hystrix* and another species, possibly *C. aurantifolia*. It has not yet come into use as a rootstock for other varieties of citrus, but trials have shown that it gives favourable results in comparison with related rootstock varieties.

Citrus—growth and environment.

1113. ČAĬLAHJAN, M. H., AND NEKRASOVA, T. V.
The early flowering of young citrus seedlings. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 79: 545-8, bibl. 12, illus.

Observations were made on seedlings, raised under glass, from seeds sown towards the end of March, of

lemon, orange, mandarin, grapefruit, trifoliata and hybrid forms. The first flower buds were seen towards the end of September on 12 grapefruit seedlings. The flowers developed from the terminal buds of main shoots and laterals. Later other flowers appeared and the plants continued to develop buds throughout the winter until May. Seedlings of other varieties did not flower during that period.

1114. TORRISI, M.

Indagini fisiologiche sugli agrumi. I. La differenziazione delle gemme a fiore del limone e dati preliminari sulla forzatura. (Physiological research on citrus. I. Flower bud differentiation in the lemon and preliminary data on development.) [English summary $\frac{3}{4}$ p.]

Ann. Sper. agrar., 1952, 6: 881-94, bibl. 20, illus.

In studies at Acireale Experimental Station in 1951 bud differentiation had already started at the beginning of January in the lemon varieties Monachello and Femminello. At this time of year differentiation is a function of temperature but in summer it is correlated with the degree of desiccation of the leaves and with the beginning of irrigation. Plants that have undergone a suitable degree of desiccation begin differentiation 6 days after irrigation; in those that have undergone less it begins later, while in those that have undergone more flowering begins much earlier. Defoliation tests suggest the formation in the leaves during development of substances which determine the differentiation of flower buds. A relationship exists between loss of water from the leaves, production and flower type.

1115. SCHNEIDER, H.

The phloem of the sweet orange tree trunk and the seasonal production of xylem and phloem.

Hilgardia, 1952, 21: 331-66, bibl. 19, illus., being *Pap. Calif. Citrus Exp. Stat.* 713.

The results are presented in detail of an anatomical study made in 1947 on 30-year-old Valencia orange trees growing on sweet orange rootstock to determine: (1) the period during the growing season when new trunk phloem was produced, in relation to the time of shoot and root extension growth and xylem production, (2) how long annual increments of phloem function, and (3) what time of the year degeneration of the older sieve tubes occurs. For the detection of phloem production, the presence of slime bodies in the developing sieve tubes was found to be the most useful indicator. Four regions of the phloem could be recognized, which, for convenience, were named the developing phloem, the functioning phloem, the degenerating phloem and the non-functioning phloem. A method used for collecting, sectioning, and staining large batches of citrus phloem is presented in an appendix.

1116. MENDEL, K.

Studies in the vitality of orange branches.

[Hebrew, with English summary 4 $\frac{1}{2}$ pp.] *Ktavim*, 1950, Vol. 1, Hebrew pp. 77-109, bibl. 85, illus., English pp. 19-23.

Studies are described on the anatomical, cytological and physiological features of Shamouti orange branches showing declining vitality. The symptoms of decline

observed in unpruned branches are described. The phenomena associated with decline proved generally to be irreversible. Anatomical and cytological examinations were found merely to give qualitative indications of the vitality of branches, whereas the following physiological tests made possible the quantitative estimation of the level of vitality: 1. Respiration rates showed significant reductions in branches that had started to decline, even when outward symptoms had barely become visible; on the average the respiration rate of declining branches was 25-6% below that of healthy branches. 2. The phosphorus content of the bark of declining branches was significantly below that of healthy branches; the former did not rise above 68 p.p.m. and the latter did not fall below 74 p.p.m., suggesting that a critical level may exist at about 70 p.p.m. 3. The measurement of the starch content of the xylem provided a rapid method of assessing the vitality of branches, and also a practical indication of the best positions at which to make pruning cuts.

1117. DRIAGINA, I. V., AND GAZOVSKAJA, N. I.
The significance of summer shading of citrus plants in the Crimea. [Russian.]
Doklady vsesojuz. Akad. sel'sk. Nauk, 1952, 17 (7): 20-4, bibl. 8, illus.

In trials at the Nikitskii Botanic Garden orange and lemon trees were shaded with 1, 3 and 5 layers of muslin. The single layer produced no noticeable effect, but the triple and quintuple thicknesses reduced the intensity of physiological processes in the plants. Fewer shoots were produced under shading, though individual leaves were considerably larger. Photosynthesis was increased at midday, but was rapidly reduced in the afternoon, well below that of the control trees. The dry matter content of shaded leaves was less than that of exposed leaves. From these observations the authors conclude that shading of citrus is unsuitable for the Crimea, except perhaps when necessary to protect blossoms or newly set fruit from drying winds.

1118. SAMYGIN, G. A., AND LIZANDR, A. A.
The ability of lemons to pass the winter in darkness at various temperatures. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, 79: 693-5, bibl. 2.

In darkness the lemon sheds more leaves the higher the temperature, because loss of leaves is associated with the development of the abscission layer, which is itself connected with the growth processes that increase in intensity as the temperature rises. When growing lemons in trenches the temperature, therefore, should be maintained a little above 0° C. and wide fluctuation should, as far as possible, be avoided.

1119. VLASSENKO, I. A., AND DOMBROVSKAJA, M. V.
The effect of long periods of darkness on the maintenance of chlorophyll in citrus under trench cultivation conditions. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1952, 82: 465-8, bibl. 2.

Experiments were carried out in the Odessa botanic garden on the change in chlorophyll content in leaves of a number of citrus varieties in a darkened trench, a trench with 50% light, one with 25% light, and an unshaded trench, protected from cold by a double

frame of glass as a control. Results show that (1) the long dark period in winter has no harmful effect on citrus; the chlorophyll content is not only not reduced but is increased, (2) the chlorophyll content of leaves from trenches with 25% and 50% light was not different from that of plants in the undarkened trenches, and (3) the accumulation of chlorophyll in citrus leaves is most pronounced during low temperatures. It is concluded that in winter the chlorophyll and carbohydrate contents of citrus plants growing in trenches are not injured by dark shading.

1120. ČAĬLAHJAN, M. H., AND NEKRASOVA, T. V.
The effect of the light of fluorescent lamps on the growth of lemon and orange seedlings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, 78: 807-10, bibl. 2, illus.

Fluorescent lights were compared with ordinary lights for illuminating lemon and orange seedlings during winter and spring months—24 December to 21 March for lemon, and 22 March to 29 May for orange. The former had the more favourable effect on plants which were more normal in appearance, whereas the latter were etiolated.

1121. EREMEEV, G. N.
The effect of different kinds of soil on the growth of roots of seedling citrus in the Crimea. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, 79: 647-9, bibl. 7.

Experiments were carried out with seedlings of six kinds of citrus, viz. *C. limon*, *C. sinensis*, *C. aurantium*, *C. junos*, *C. natsudaïdai*, and *Poncirus trifoliata*, grown in pots, with three types of soil, (1) mountain pasture, (2) brown woodland, and (3) brown calcareous, using 1-year-old and 2-year-old plants. The best rooting in five of the six species was obtained in mountain pasture soil, and the worst in the brown calcareous soil. In *C. junos* growth was about equal in those two types of soil.

1122. HERRERO EGAÑA, M.
Los suelos del naranjo en los términos de Carcagente y Alcira. (The orange soils of Carcagente and Alcira.)
An. Inst. nac. Invest. agron. Madrid, 1952, 1: 241-96, bibl. 5.

The chemical and physical characters of the various soil types of Carcagente and Alcira, Spain, are correlated with the quality of the oranges grown on them, and recommendations are made on the choice of soils for particular varieties.

Citrus—cultivation and irrigation.

(See also 225, 1220w.)

1123. MARLOTH, R. H.
Why not double plant citrus?
Fmg S. Afr., 1952, 27: 369-70.

It is suggested that whether citrus trees are planted on the square or on a modified contour system it would be desirable to double the initial stand per acre by planting filler trees in, but not between the rows. An experiment has been laid down at the Alkmaar Substation to determine at what stage, if any, the alternate trees should be removed.

1124. FRITH, H. J.

Some effects of no cultivation on the yield and growth of citrus trees.

Aust. J. agric. Res., 1952, 3: 259-76, bibl. 12.

A factorial field experiment is described in which cultural, irrigation, and nitrogen treatments were tested on citrus trees of different stocks and scions. The sod treatment quickly caused decreases in growth of the trees and the yield and quality of the fruit produced. The plots where bare soil was maintained have given large healthy trees with high yields of good-quality fruit, in spite of an observed deterioration of soil structure in these plots. Nitrogen treatments improved the yield and health of the trees in the sod treatments but have had no effect on the other cultural treatments. Root distribution, soil fertility, and leaf analysis studies, undertaken to try to explain the reasons for the yield differences noted, are described and it is concluded that nitrogen effects could explain all differences recorded to date. [Author's summary, see also *H.A.*, 22: 4240 and 4241].—C.S.I.R.O. Irrig. Res. Stat., Griffith, N.S.W.

1125. SITES, J. W.

Production studies—cultivation vs. non-cultivation.

A.R. Fla agric. Exp. Stat. for 1950/51, p. 144.

From 1941 about one half of a block containing 64 mature trees of Marsh Seedless grapefruit was disced 3 times a year, while the other half with 56 trees was left uncultivated. To date the trees receiving cultivation produced an average of 9·81 boxes of fruit per year, and the uncultivated 8·65 boxes. The increase of 1·16 boxes of grapefruit per tree per year due to cultivation is highly significant.

1126. LAWRENCE, F. P.

Citrus cover crops.

Proc. Fla St. hort. Soc. for 1949, pp. 3-7 [received Nov. 1952].

Data obtained in several groves in recent years indicate that *Indigofera hirsuta* is a most promising cover crop for citrus. Sown in the spring at 4 to 8 lb. per acre it yields about 15,000 lb. green matter per annum. It does not appear to delay maturity in citrus and may increase the solids and juice content of the fruit.

1127.* OPPENHEIMER, H. R.

Water requirement and irrigation of citrus groves.

[*Mim. Pap.*] *13th int. hort. Congr.*, London, 1952, pp. 6, bibl. 21.

The problems of citrus irrigation which essentially mean the finding of an answer to the question, how much water should be distributed each time and at what intervals, have already been dealt with by Ferrarius. Ecological research done by the author and his associates in the past 20 years has elucidated various phases of water relations and especially leaf transpiration, naturally occurring water deficits, influence of root-stock and the influence of soil moisture on these phenomena. Stomatal regulation was found to play an important part in these water relations. The above defined main problem was tackled by use of physiological indices, viz. fruit growth and stomatal reactions, which have been found very useful. A solution has been found for mature orange groves on the typical sandy

soils of the coastal plain of Israel. With a high efficiency of irrigation, about 6,500 m³ per ha., distributed in 9 to 13 irrigations, according to soil type, have been found adequate for the six months' irrigation season. The complete saturation of the root zone has been found more important than the immediate application of water as soon as the trees' reactions indicate the necessity. These reactions were found to set in when the suction tension of the soil attains 3-4 atmospheres. Rough lemon stock makes the trees more drought-resistant than sweet lime and sour orange stock. Since the industry is faced with the necessity for economizing and labour is expensive, most of the citrus groves in Israel are now irrigated by sprinklers. Short range types, distributing rain below the leafy tops, have been found preferable to long range sprinklers showing rather irregular distribution patterns and entailing considerable water losses. [Author's summary.]

1128. SITES, J. W., REITZ, H. J., AND DESZYCK, E. J.
Some results of irrigation research with Florida citrus.

Proc. Fla St. hort. Soc. for 1951, pp. 71-9, bibl. 2.

Data from field experiments lasting several years on oranges and grapefruit indicate that: (1) continuous abundant soil moisture produced fruit high in juice and low in soluble solids and acid; (2) extended drought for about 100 days after bloom appeared to promote a high acid content in the fruit; (3) extended drought for the period from about 100 to 200 days from bloom appeared to promote high soluble solids and moderately high acid in the fruit; (4) drought during the latter part of the season appeared to have little or no effect on fruit quality, but rain or irrigation during this period lowered soluble solids and acid; (5) irrigated orange and grapefruit trees grew faster, and produced larger fruit with a greater tendency towards granulation, than unirrigated trees, but yields were variable.

1129. WANDER, I. W., AND REITZ, H. J.

The chemical composition of irrigation water used in Florida citrus groves.

Proc. Fla St. hort. Soc. for 1950, pp. 11-17, bibl. 15 [received Nov. 1952].

The total soluble salts present in an irrigation water is probably the best single index to use in evaluating the water. The climatic conditions and soil types in Florida permit the use of water containing greater amounts of soluble salts than is ordinarily considered safe. It is essential that, when irrigating with a high mineral content water, the soil moisture is maintained as high as practical. Strontium was found in the water from wells on both the east and west coasts of Florida and may or may not present a hazard to citrus. [From authors' summary—a full account of this work was noted in *H.A.*, 22: 4302v.]

Citrus—tree composition and nutrition.
(See also 1220j.)

1130. REUTHER, W., SMITH, P. F., AND SPECHT, A. W.

A comparison of the mineral composition of Valencia orange leaves from the major producing areas of the United States.

Proc. Fla St. hort. Soc. for 1949, pp. 38-45, bibl. 18 [received Nov. 1952].

* See note, p. 3.

In 1947 and 1948 samples were collected of 2½ to 5-month-old spring-cycle leaves from Valencia orange groves in Florida, Texas, Arizona and California, and were analysed for N, P, K, Ca, Mg, Na, Zn, Cu, Fe, Mn and B. The results obtained are tabulated and discussed. They indicate wide differences in contents of K, Ca and certain trace elements between Florida citrus and citrus from the western States.

1131. SMITH, P. F., REUTHER, W., AND SPECHT, A. W.

Seasonal changes in Valencia orange trees. II. Changes in micro-elements, sodium, and carbohydrates in leaves.

Proc. Amer. Soc. hort. Sci., 1952, 59: 31-5, bibl. 6.

Concentrations and absolute amounts of B, Cu, Fe, Mn, Zn and Al, and percentages of Na, sugars and starch were determined over 2 years in spring and summer leaves of Valencia orange in Florida. All the mineral elements occurred in higher concentrations in the spring than in the summer leaves. Fe and Al accumulated nearly continuously over the whole period, and at no stage were these elements or Na lost from the leaf. B tended to increase throughout the life of the leaf except in winter, when it remained stationary, and during the period of spring blossoming, when a significant fraction was lost. Cu, Mn and Zn stopped accumulating after a given amount had been taken up and may have been redistributed in part thereafter; Cu appeared to be the most mobile of the elements. Total sugars fluctuated considerably from month to month, showing the greatest loss during the period of spring flush and bloom. Starch was present in small amounts, accumulating over winter and decreasing sharply soon after the advent of spring growth. [For part I, concerned with changes in leaf dry weight, ash and macro-nutrient elements, see *H.A.*, 21: 960.]

1132. JONES, W. W., AND STEINACKER, M. L.

Carbohydrates in citrus.

Calif. Agric., 1952, 6(8): 9.

The starch and sugar contents of leaves and twigs of vigorous, bearing Valencia orange trees were at their lowest in summer. Sugar increased rapidly in December reaching a maximum in late January; this preceded a large increase in starch accumulation which reached a maximum in March. Eureka lemon leaves also showed an increase in sugar during the winter but not to the same extent as the orange leaves. [See also *H.A.*, 22: 2950.]

1133.* CHAPMAN, H. D.

Studies on the nutrition of citrus.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10+5 folded tables, bibl. 27.

The vigour, growth, appearance, and fruit quality characteristics of citrus trees caused by deficiencies of all the now known necessary nutrient elements are summarized in tabular form, as are the present leaf analysis standards useful in this connexion. Controlled nutrient culture work with citrus trees has uncovered many nutrient interrelations of interest. Thus it has been definitely shown that typical iron deficiency patterns on citrus leaves (all remediable by iron sprays) have been produced by such diverse conditions as (1)

low soil temperatures; (2) slight excesses of zinc in the culture medium; (3) acute magnesium deficiency; (4) acute potassium deficiency; (5) magnesium excesses; (6) sodium bicarbonate excess; (7) in sand cultures where various balances between relative quantities of calcium carbonate, and magnetite of various states of subdivision were employed; (8) overmoist conditions in soils. The fruit quality characteristics produced by various mineral deficiencies are summarized in tabular form. Also touched on are various relations between nutrient status and susceptibility to insect and disease attack. A brief discussion of the citrus replant problem in California, its causes, and control is also included. [Author's summary.]

1134. HEYMAN-HERSCHBERG, L.

Soil and leaf analyses as indicators of fertiliser requirements in Shamouti orange groves. [Hebrew, with English summary 1 p.]

Ktavim, 1950, Vol. 1, Hebrew pp. 111-36, bibl. 38, English pp. 25-6.

Spring proved the most suitable season for analysing soil N and P in Shamouti orange groves established on sandy, coastal soils in Israel. Leaf composition reflected differences in tree nutrition most clearly in summer, whereas nutritional deficiencies were best detected in winter after ripening of the fruit. Nitrate levels in the top 30 cm. of soil ranged from 4 to 12 p.p.m., 10 p.p.m. indicating adequate N nutrition. Available P in the top 60 cm. ranged from 12 to 93 p.p.m. and depended largely on P fertilization of the groves. The application of superphosphate in solution increased the availability and percolation of P. There was generally a negative correlation between leaf N and leaf P, but this relationship became positive when the supply of N was ample. In most of the examined groves leaf N was low (about 1.8% D.M.) and because of this and the use in some cases of superphosphate P was high and sometimes excessive. Full details of this work are to be published elsewhere.

1135. BEDRIKOVSKAJA, N. P.

Nutrition and frost resistance of the mandarin tree. [Russian.]

Doklady vsesojuz. Akad. sel'sk. Nauk, 1952, 17 (4): 30-4, bibl. 4.

Observations made during the severe winters of 1947/48 and 1949/50 have conclusively shown that increased nutrition of the mandarin tree increased its frost resistance. It is recommended that the podsol soils on the shores of the Black Sea should be cultivated in the summer and afterwards sown to autumn-winter legumes. In fertilizer trials nitrogen played the most important part in the improvement of yield and frost resistance of the tree, best results being obtained by trebling the normal N application and doubling that of P.

1136. REUTHER, W., AND SMITH, P. F.

Relation of nitrogen, potassium, and magnesium fertilization to some fruit qualities of Valencia orange.

Proc. Amer. Soc. hort. Sci., 1952, 59: 1-12, bibl. 19, illus.

Relation of fertilizer treatment to fruit quality of Valencia oranges.

Proc. Fla. St. hort. Soc. for 1951, pp. 29-35, bibl. 9, illus.

* See note, p. 3.

Three levels of N, K and Mg fertilization have been compared in a $3 \times 3 \times 3$ factorial experiment on Valencia oranges on rough lemon stock planted in Florida on an acid sandy soil in 1942. To date, the data indicate that high N has increased growth (trunk cross sectional area), increased yield substantially, reduced fruit size slightly, increased total acids in the juice slightly and depressed total soluble solids and vitamin C; degreening of the rind and maturity have been somewhat delayed. K has not affected growth or yield appreciably, but high K, associated with 1.6 to 1.9% K in dry matter of 9-month-old spring flush leaves sub-tending fruit, has tended to produce a high proportion of late-maturing, poorly coloured, large, coarse fruit with low total soluble solids in the juice. Low K, associated with 0.7 to 1.0% K in leaves had the reverse effect on quality. The rate of Mg fertilization has not affected growth, yield or fruit quality appreciably. The conflicting results obtained by some other workers in this field are discussed.

1137. WALLACE, A., AND OTHERS.

Influence of nitrogen fertilizers on orange trees and on the soil in the coastal zone of Southern California.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 22-30, bibl. 25.

Part of a mature Valencia orange orchard on a Yolo silt loam soil that was put under a non-tillage system of management in 1941 [see *H.A.*, 22: 2942] received 4 lb. N per tree per annum in 2 applications and the remainder nil. In the preceding 11 years all trees had received about 3 lb. N per year, half of which was in organic form. Under the mild climatic conditions of this region cessation of N manuring had shown no depressing effect after 9 years in yield and no leaf symptoms. The leaf N content remained above the 2.0% critical level, and there was less than 15% difference between manured and unmanured trees. Leaves from the N trees contained less P, K and Mg and more Ca than those from the no-N trees. Differences in the fruit in N and other constituents were more marked between the N and no-N trees. The application of N resulted in a marked depression of pH in the surface soil, whereas pH increased with no N due partly to Ca in the dropped leaves. The N trees possessed fewer than 50% as many rootlets as the no-N trees in the surface 6 in. of soil. Where N was applied an estimated 15% of the fertilizer N was recovered by the trees in any one year.

1138. HERRERO EGAÑA, M.

Proceso de asimilación del nitrógeno por el naranjo. (The process of nitrogen assimilation by the orange.)

An. Inst. nac. Invest. agron. Madrid, 1952, **1**: 217-24, bibl. 8.

The results of analyses of the nitrogen content of the leaves of Washington Navel orange trees throughout the year are presented in a table and graph. Although fertilizer was applied in February the N values of the leaves decreased until May, indicating that N assimilation was not sufficient to meet the physiological needs of the tree. During June to October N accumulated in the leaves, but thereafter it decreased.

1139. EMBLETON, T. W., KIRKPATRICK, J. D., AND PARKER, E. R.

Field response by orange trees to phosphatic fertilizers.

Calif. Citrogr., 1952, **37**: 463, 481-3, bibl. 5, illus.

Phosphate deficiency symptoms are described as observed in a Valencia orange orchard established on a sandy loam of very low exchange capacity. Among various manurial treatments applied in 1950 and 1951 those containing P have resulted in a general increase in the amount of foliage growth, an improvement in foliage colour, increased fruit set, reduced fruit size and improved fruit quality. Associated with this response the percentages of P and Ca in the leaves have increased and those of N and K decreased throughout the year.

1140. ALDRICH, D. G., AND COONY, J. J.

A field response of citrus to phosphorus and potassium fertilization.

Proc. Amer. Soc. hort. Sci., 1952, **59**: 13-21, bibl. 7, illus., being *Pap. Calif. Citrus Exp. Stat.* 718.

Trials with NPK, NP, NK and N were started in 1949 on lemons growing on 3 rootstocks in 6 sites in California. The trees showed leaf spot symptoms and unthrifty foliage with tip or marginal burn and some defoliation. Within 4 months of application, whether this was made in spring or autumn, a marked improvement in foliage occurred in trees that had received P. Where no P was applied, leaf analyses showed P contents of 3- to 7-month-old leaves in every orchard to be below 0.07% dry matter, the tentative upper level of deficiency established by Chapman *et al.* [see *H.A.*, 22: 878]. The application of K did not seem to affect tree appearance or vigour but produced small, consistent yield increases. Similar results have been obtained in the last 2 years with phosphate-deficient Valencia and navel oranges.

1141. SITES, J. W.

The effect of variable potash fertilization on the quality and production of Duncan grapefruit.

Proc. Fla. St. hort. Soc. for 1950, pp. 60-8, bibl. 20 [received Nov. 1952].

From 1939 onwards mature Duncan grapefruit trees received uniform dressings of N, P, Mg, Mn and Cu and 4 levels of K_2O equivalent to 0, 3, 4 and 10% of the fertilizer mixture. K deficiency has resulted in slow growth, thinning of the tops of the trees, loss of young shoots by wind, increased pre-harvest fruit drop and decreased production; the fruit matured earlier, was small in size with good texture and thin rinds and was characterized by reduced soluble solids, citric acid and vitamin C. A 1:1 N: K_2O fertilizer ratio gave lower yields than a 1:1.67 ratio. With K the acid content of the juice increased and the soluble solids: citric acid ratio decreased.

1142. SMITH, P. F., AND REUTHER, W.

Observations on boron deficiency in citrus.

Proc. Fla. St. hort. Soc. for 1949, pp. 31-7, bibl. 13, illus. [received Nov. 1952].

The symptoms of B deficiency in citrus, as found by the authors in sand cultures and in the field and by other

workers, are described in detail. The effects of spraying apparently deficient Washington Navel trees with borax on leaf symptoms, leaf B contents and fruit set are indicated.

1143. WILLSON, A. E.

Boron nutrition in citrus.

Proc. Fla. St. hort. Soc. for 1951, pp. 53-7, bibl. 18.

Numerous determinations of B in leaves, fruit, twigs and roots of citrus trees in Florida have shown that visible symptoms are an unreliable guide to B deficiency. Data from B treated grapefruit showed that high levels of B in the leaves was accompanied by only a slight increase in the B level of the fruit. There was no relationship between B treatment and the proportion of gummed grapefruit among dropped fruits. The results of the study suggest that too much B is being applied in many orchards.

1144. STEWART, I., AND LEONARD, C. D.

Possible causes and control of iron chlorosis.

Calif. Citrogr., 1952, 37: 427, 444-5, bibl. 10, illus.

ALEXANDER, C. C., AND WALSH, D.

Control of iron chlorosis.

Agric. Chemls, 1952, 7(7): 36-8, illus.

Preliminary attempts to correct Fe deficiency chlorosis in citrus in Florida by various forms of spraying, capsule injection and soil application were unsuccessful. Injections under pressure of iron sulphate in solution caused responses, but the immersion of individual roots in a solution of iron sulphate only resulted in uptake when citric acid was added. The application of the iron sulphate-citric acid solution to soil did not, however, produce a response. Recently a search for a form of Fe that would be available when applied to soil has shown that iron chelated with salts of ethylenediamine tetraacetic acid (EDTA) is readily absorbed and translocated. Good responses have been obtained with as little as 10 g. Fe per tree, and 20 g. have been consistently effective. Experiments are in progress with dry forms of Fe EDTA and with other chelated metal complexes. The second article reviews the work done by Stewart and Leonard.

1145. STEWART, I., AND LEONARD, C. D.

Molybdenum deficiency in citrus.

Proc. Fla. St. hort. Soc. for 1951, pp. 51-3, bibl. 5, illus.

Mo deficiency, characterized by large yellow spots on the leaves, is widespread in Florida citrus. In the yellow spots gum and oil are deposited in the cell cytoplasm, the intercellular spaces and apparently sometimes in the nucleus, cork cells are formed on the undersides of leaves, and chlorophyll decomposes. Affected leaves respond to spraying with Mo, sometimes only the cork cells remaining.

1146. HEALY, W. B.

Note on zinc deficiency of citrus at Aitutaki, Cook Islands.

N.Z. J. Sci. Tech., Sect. A, 1952, 34: 228-9, bibl. 1, illus.

The leaves of chlorotic orange trees at Aitutaki contained 7.1 p.p.m. Zn (oven-dry basis), and responded to spraying with ZnSO₄ and a "complete" trace element spray.

1147. ALDRICH, D. G.

A pressure apparatus for tree injection.

Proc. Amer. Soc. hort. Sci., 1952, 59: 349-51, bibl. 3, illus., being *Pap. Calif. Citrus Exp. Stat.* 116.

The injection apparatus described in this report is a simple, accurately controlled, easily acquired and constructed device for injecting solutions into trees. Examples are given of the successful employment of the apparatus in certain citrus nutritional investigations. [Author's summary.]

Citrus—control of fruit set and drop.

1148.* STEWART, W. S.

Effects of growth regulator sprays on set, size, abscission, and storage of citrus fruit.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6.

In Californian experiments on Valencia and Washington Navel oranges water sprays of 2,4-D and 2,4,5-T applied at flowering caused an increase in fruit size but did not increase fruit set. Sprays applied in May or June before "June-drop" likewise increased fruit size but failed to increase the number of fruits harvested per tree, and at high concentrations reduced the number of fruit per tree and lowered fruit quality. To increase fruit size it is suggested that the concentration of 2,4-D in the spray should be increased according to the age of the fruit, since the older fruit is less responsive than the younger, and that only one spray application should be made during the season. The concentrations are: fruit 4-6 weeks old (i.e. from full bloom) 16 p.p.m. 2,4-D; 6-10 weeks, 24 p.p.m.; 10-12 weeks, 32 p.p.m.; and 12-24 weeks, 40 p.p.m. A drenching spray of 2,4-D applied at 8 p.p.m. on citrus trees bearing mature fruit significantly reduced preharvest drop (approximately 60%) for as long as six months and this concentration is suggested for commercial use. Fruit from trees sprayed with 2,4-D to reduce fruit drop had a longer storage life than fruit from non-sprayed trees. Lemons from non-sprayed trees when dipped in solutions of 2,4-D or 2,4,5-T had an increased storage life compared with fruit similarly treated but without the growth regulator. A concentration of 200 p.p.m. 2,4,5-T is suggested for use in storage houses except those using nitrogen trichloride gas for decay control, since an interaction between this gas and the growth regulator caused an undesirable rind stain. [From author's summary—see also abstracts 1149 and 1184.]

1149. STEWART, W. S., HIELD, H. Z., AND BRANNAMAN, B. L.

Effects of 2,4-D and related substances on fruit-drop, yield, size, and quality of Valencia oranges.

Hilgardia, 1952, 21: 301-29, bibl. 19, being *Pap. Calif. Citrus Exp. Stat.* 710.

In 29 tests during 1947 and 1948 in southern California low volume applications of 2,4-D at concentrations of 4 to 48 p.p.m. reduced the drop of Valencia oranges by an average of 35.1%. Sprays applied 6 months before harvest appeared to be as effective as those applied only 1 month before. Studies were also made in 1948 on the effect of 17 chemicals applied at full bloom on fruit size; of these only 2,4-D and 2,4,5-T induced significant

* See note, p. 3.

increases in size. This response to 2,4-D was confirmed in 8 additional field trials. The treated plots yielded per 100 trees an additional 28.0 boxes of fruit size 220 and larger, and 19.8 boxes less of fruit size 252 and smaller. The increase in fruit size was shown to be due to an increased growth rate. As fruits developed they seemed to become less responsive to 2,4-D and after about 16 weeks responses even to relatively high concentrations became negligible. [For an account of similar work on Washington Navel oranges see *H.A.*, 22: 1796 and abstract 1148 above.]

1150. GARDNER, F. E., REECE, P. C., AND HORANIC, G. E.

The effect of 2,4-D on pre-harvest drop of citrus fruit under Florida conditions.

Proc. Fla. St. hort. Soc. for 1950, pp. 7-11, bibl. 5 [received Nov. 1952].

2,4-D at 25 and 50 p.p.m. effectively reduced drop in Pineapple oranges in 2 years but had no effect on Valencia oranges. The addition of wettable sulphur did not reduce the effectiveness. Three other acids, 2-methyl 4-chlorophenoxyacetic, 2-methyl phenoxy alpha-butyric and 2-methyl 4-bromophenoxyacetic, did not reduce drop in either variety. The application of 2,4-D at these low concentrations and at a season when no young growth is present had no observable effect on foliage. A case is recorded, however, when 2,4-D used in mid-summer as a herbicide at 1,000 p.p.m. was washed into the soil and killed Pineapple orange trees growing on rough lemon stock. Similar trees on sour orange stock growing in somewhat heavier soil were unaffected by the same treatment applied on the same day.

1151. HALSE, N. J.

Reduction of pre-harvest drop of Washington Navel oranges by 2,4-D sprays.

J. Agric. W. Aust., 1952, 1(n.s.): 327-30, bibl. 2.

2,4-D is much more effective than NAA for reducing pre-harvest drop with citrus fruits. An experiment described showed that a concentration of 4 p.p.m. was inferior to 8 p.p.m. The March application of 4 p.p.m. was not effective in reducing drop, but a higher concentration might have been successful. The applications in April and June were both effective. A 2,4-D spray of 8-10 p.p.m. can be successfully combined with an early winter copper fungicide spray. Another likely benefit of the spray would be the reduced number of oranges with separated buttons.

Citrus—diseases and pests.

(See also 1220e, g, i, t.)

1152. SCHNEIDER, H., AND WITT, R. L.

Sieve tube necrosis in lemon strains.

Calif. Citrogr., 1952, 37: 478-81, bibl. 4.

A method of rating the health of the phloem of lemon trees by anatomical examination is described, and ratings are tabulated for a number of lemon strains and selections. The results show relatively good correlations with top symptoms. The examinations have shown that renewing strains by using nucellar seedlings does not eliminate the tendency to sieve-tube necrosis. As a class, selected Lisbon strains show much less necrosis

than Eureka strains; none of the latter has yet been found which does not show necrosis at times.

1153. CALAVAN, E. C., AND WALLACE, J. M.

Lemon tree collapse not caused by the quick-decline virus.

Plant Dis. Repr., 1952, 36: 101-2, bibl. 10, reprinted in *Calif. Citrogr.*, 1952, 37: 274, 304-5.

Available evidence indicates that rapid decline and collapse of lemon trees is not caused by the quick decline virus; the insertion of buds from collapsed trees into healthy lemon trees failed to induce any symptoms of the disease. Differences between lemon tree collapse and orange tree quick decline are listed. Some lemon tree selections appear to be resistant to collapse and allied disorders. There is evidence that Eureka lemon may be a symptomless carrier of quick decline.

1154. GIACOMETTI, D. C., AND STOREY, W. B.

Citrus quick decline discovered in Hawaii.

Calif. Citrogr., 1952, 37: 357, bibl. 6, illus.

A survey has shown stem-pitting to be widespread in Hawaii in certain citrus varieties. Severe pitting was found in Mexican lime and Lakeland limequat, less severe pitting in Kusaie lime, Rangpur lime, Mediterranean sweet orange and the navel oranges Golden Buckeye, Washington and Carter, and slight pitting in 2 varieties of shaddock and 4 of grapefruit. No pitting has been found in Kona and Valencia sweet oranges, 4 lemons including rough lemon, 2 mandarins, 2 kumquats, the Tahiti lime and Calamondin.

1155. GRANT, T. J., COSTA, A. S., AND MOREIRA, S.

Variations in stem pitting on tristeza-inoculated plants of different citrus groups.

Proc. Fla. St. hort. Soc. for 1951, pp. 42-7, bibl. 9.

The presence and degree of pitting was recorded in Brazil, on a numerical rating basis, for 3,543 citrus plants inoculated with tristeza, by examination of the wood at the point where the second or third flush below the terminal growth ended. The plants included seedlings, stocks and scions. Among mandarins there were few or no pits. Among sweet oranges there appeared to be varietal differences; pitting was most noticeable when they were grown on tolerant rootstocks and when no other tristeza symptoms were present. There may also be varietal differences among grapefruits, but these tended to show pitting whether used as scions or stocks or grown as seedlings. Tangelos had less pitting than grapefruits but rather more than mandarins. Results with pummelos, trifoliate hybrids, lemons and limes suggest that minor differences in hybrid plant reactions can have an important effect on the presence and degree of pitting. Sour oranges, including bitter-sweet varieties, showed little or no pitting.

1156. STEYAERT, R. L., AND VAN LAERE, R.

La "cannelure" ou "stem pitting" du pamplemoussier au Congo Belge. (Stem pitting of grapefruit in the Belgian Congo.) *Bull. agric. Congo belge*, 1952, 43: 447-54, bibl. 4, illus.

A disease of Marsh grapefruit on rough lemon stock in the Belgian Congo described by the junior author in 1949 under the name of "cannelure" (grooving) has symptoms identical to those of stem pitting described

from South Africa. These symptoms, both external and anatomical, are described. The need for studying various species as rootstocks is indicated. These include indigenous species of *Citropsis*, among which is *C. gillettiana*, a type that has been tried on a small scale with very conflicting results.

1157.* REICHERT, I.

Xyloporosis in citrus.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 11.

Little leaf disease of the sour orange rootstock discovered in 1928-30 in Palestine is found to be the same as xyloporosis on sweet lime rootstock and can be termed xyloporosis. The symptoms, which are described, resemble those of stem-pitting, tristeza and quick-decline and stubborn disease, but negative inoculations by Costa, Childs and others and the fact that citrus trees in Israel do well on sour orange indicate that external similarity does not suffice for identity. Xyloporosis must be considered as different from the tristeza group. [From author's summary.]

1158. CHILDS, J. F. L.

Cachexia, a bud-transmitted disease and the manifestation of phloem symptoms in certain varieties of citrus, citrus relatives and hybrids.

Proc. Fla. St. hort. Soc. for 1951, pp. 47-51, bibl. 11.

The symptoms of cachexia in Orlando tangelo are phloem discoloration, wood-pitting, bark cankers, stunting and chlorosis, which appear to be identical with those of xyloporosis in sweet lime. Studies have shown cachexia to be bud transmissible but not to spread naturally from diseased to healthy trees. Varieties, used as rootstocks, showing the disease have been found among mandarins, tangelos, tangors, kumquats and limequats. There is evidence that sweet orange and grapefruit are symptomless carriers. From the host relationships it would appear that cachexia and tristeza are distinct diseases.

1159. SUIT, R. F., AND FORD, H. W.

Present status of spreading decline.

Proc. Fla. St. hort. Soc. for 1950, pp. 36-42, bibl. 2 [received Nov. 1952].

Studies on the spreading decline disease of citrus in Florida suggest that the citrus nematode, *Tylenchulus semipenetrans*, is not primarily responsible, but that a *Fusarium* sp., consistently isolated from the roots of diseased trees, may be the cause. Over 5 years the number of affected trees increased 2 to 9 times in different recorded groves. Tests indicate that any control based on removing trees should include at least 4 healthy trees beyond the outermost diseased tree. Field trials with D-D applied at 400 lb. per acre to diseased areas before replanting have given promising results.

1160. WAGER, V. A.

The black spot disease of citrus in South Africa.

Sci. Bull. Dep. Agric. S. Afr. 303, 1952, pp. 52, bibl. 14, illus., 6d.

Black spot disease, *Phoma citricarpa*, occurs in both humid and arid areas in South Africa and attacks

* See note, p. 3.

smooth lemons (but not, or only very rarely, rough lemons), Valencias, Washington Navels, grapefruit and mandarins. Infection occurs equally on young and old, and healthy and unhealthy trees, and incidence is closely related to temperature, development being rapid over 70° F. Pycnospores require droplets of water for their emergence and dispersal, and ascospores are forcibly ejected into the air and are dispersed by wind. Detailed results of experimental study of the disease are given. Where the disease normally appears in spring early maturity can be induced by spraying with lead arsenate and the crop can thus be harvested before spotting becomes serious. Cheap and effective control is obtainable with bordeaux mixture 2-1-80. The trees are sprayed thrice at six-week intervals starting at two-thirds petal drop, casein spreader being added to the first two sprays and white oil to the third. Trees should be defoliated before being removed from the nursery.

1161. MALAGUTI, G.

Epifitias de "tizón" en plantas cítricas causadas por *Phytophthora parasitica*. (Epi-phytotics of "blight" in citrus plants caused by *Phytophthora parasitica*.)

Agron. trop., Maracay, 1951, 1 (3): 213-26, illus., from abstr. in *Rev. appl. Mycol.*, 1952, 31: 380.

Phytophthora parasitica, the common agent of citrus foot rot and gummosis in Venezuela, is here recorded for the first time as the cause of a top wilt of sour orange seedlings and a foliar wilt and stem rot of the scions of nursery grafts of sweet orange, mandarin, grapefruit, and lemon. Inoculation tests with *P. parasitica* on 12-year-old Marsh grapefruit, Criolla and California orange, and French lemon trees resulted in the development of foot rot. The fungus also caused a fruit rot of Meyer and Villafranca lemons, California and Valencia oranges, and tomato, and a stem rot of potato and *Vinca rosea*. The disease was effectively combated in the seed-bed and nursery by spraying with copper A compound, Shell copper, or dithane. In February, 1951, orange seeds were sown in soil treated with 2% copper sulphate at a dosage of 5 l. per sq. m. following heavy infestation by *P. parasitica*. A month after germination 35% of the seedlings were dead compared with 100% in the unsterilized seed-beds and those treated with other fungicides.

1162. SARMA, K.

The *Loranthus* parasite as a pest on citrus trees in Assam.

Indian J. Hort., 1952, 9 (2): 18-21, bibl. 8.

The four species of *Loranthus* troublesome to citrus in Assam and their favourite hosts are *L. longiflorus* (on rough lemon), *L. involucreatus* and *L. scurrula* (on mandarin orange) and *L. ampullaceus* (on lemon). The mandarin is a host for all 4 species and rough and smooth lemons are hosts for 3. Attack causes unproductivity and in extreme cases die-back and death. Control is by removal of infested parts.

1163. GUICHERD, P. P.

La mouche noire des Aurantiacées au Mexique. (The citrus black fly in Mexico.) *Fruits d'Outre Mer*, 1952, 7: 371-9, bibl. 3, illus.

Aleurocanthus woglumi has caused very great damage in citrus plantations since it was first reported in Mexico in 1935. The introduction of its parasite, *Eretmocerus serius*, which is multiplying rapidly, is preventing its spread. The biological cycle of the blackfly is described. Factors inimical to the pest are rain which destroys the adults, hot sunlight which kills all stages, drought which kills the larvae, wind which causes the destruction of the eggs by shaking them off the trees, and fungal pests and carnivorous insects which account for many larvae.

1164. JEPSON, L. R., AND CARMAN, G. E.

Mites on citrus.

Calif. Agric., 1952, 6(9): 14.

The acaricides *p*-chlorophenyl *p*-chlorobenzene sulphinate (Ovotran, etc.) and 2-(*p*-tert-butylphenoxy) isopropyl 2-chloroethyl-sulphite (Aramite) have shown exceptional promise for the control of citrus mites. The results of spray and dust trials with them are outlined and their compatibility with other spraying materials is indicated.

1165. THOMPSON, R. K., AND WHIPP, A. A.

New chemicals for control of citrus red mite *Paratetranychus citri* (McG.).

Proc. Fla. St. hort. Soc. for 1951, pp. 35-9, bibl. 5.

Results presented from 8 trials indicate that the following materials should give good control of citrus red mite: *p*-chlorophenyl *p*-chlorobenzene sulphinate (known as HL 512 or K-6451), 2-(*p*-tert-butylphenoxy) isopropyl 2-chloroethyl sulphite (HL 477 or Aramite 88R or Orthomite), a trialkyl thiophosphate known as HL 528, and dinitro-*o*-cyclohexylphenol (DN). The first two can safely be used at any season. HL 528 has systemic action and is too toxic to warm-blooded animals for use near to harvest. DN should be used only in cool weather because it is phytotoxic at high temperatures.

1166. VERGANI, A. R.

Reconocimiento de la "lepra explosiva" del naranjo y del "tostado" de los frutos citricos. (Recognition of "lepra explosiva" of the orange and "toasting" of citrus fruits.)

Alm. Minist. Agric. B. Aires, 1951-52, 1951, p. 96, from abstr. in *Rev. appl. Mycol.*, 1952, 31: 326.

In Argentina both "toasting" or "black orange" of citrus fruits caused by the acarid *Phyllocoptruta oleivorus* and "lepra explosiva" [leprosis] of orange associated with the acarid *Tenuipalpus pseudocuneatus* may be controlled simultaneously by two applications of 1% lime sulphur (32° Baumé), one in November to December and the other in February to March.

1167. MITROFANOV, P. I.

Trials of thiophos on citrus. [Russian.]

Sad i Ogorod, 1952, No. 9, pp. 35-7, ill.

Results of trials in Russia have shown thiophos (NIUIF-100) dust applied in a 4% water suspension to be very effective for the control of mealy bugs (*Pseudococcus* sp.) on citrus. The treatment caused no injury to the trees, almost doubled yields compared with the controls, and improved fruit quality.

1168. WHITEHEAD, G. B.

Some notes on the insect ecology of citrus and the use of insecticides.

Plant Prot. Overseas Rev., 1952, 3(2): 16-20, bibl. 4, ill.

Notes are given on the following predators and parasites of citrus red scale, *Aonidiella aurantii*, in South Africa: *Aphytis chrysomphali*, *Pharoscymnus sexguttatus*, *Lotis nigrifula*, *Exochomus flavipes*, *Chrysopa vulgaris*, *Eublemma costimacula*. That these play a considerable part in its biological control is illustrated by the fact that trees with a large population of ants (which affect the balance of nature) are often heavily infested with the pest, whereas neighbouring trees with a small ant population are lightly infested. Hydrocyanic acid, which has long been used for the control of red scale, does not upset the balance but there is a danger that modern insecticides may do so. It is recommended that these should be used in a manner complementary to, and not at the expense of, biological control.

1169. THOMPSON, W. L., GRIFFITHS, J. T., AND SITES, J. W.

A comparison of oil emulsion and parathion for the control of scale insects on citrus.

Proc. Fla. St. hort. Soc. for 1951, pp. 66-71, bibl. 10.

In trials over 4 years parathion has generally given control similar to that of oil sprays of purple scale, *Lepidosaphes beckii*, and Florida red scale, *Chrysomphalus aonidum*. The weather should, however, be warm, dry and wind-free for parathion to be fully effective. The use of parathion resulted in less dead wood and in higher yields over 3 years in orange and grapefruit trees than when oil was used. Fruits from parathion sprayed trees contained more soluble solids and vitamin C and coloured better when treated with ethylene gas.

1170. TOFIÑO OREJUELA, T. E.

Efecto residual del DDT asociado a las emulsiones de aceite para el control de 3 especies de Diaspididae (Homoptera-Coccoidea). (Residual effect of DDT in oil emulsions in the control of 3 species of Diaspididae.)

Acta Agron. Palmira, 1952, 2: 161-2.

The incidence of migratory larvae of the citrus scales, *Unaspis citri*, *Lepidosaphes beckii* and *Chrysomphalus dictyospermi* was reduced to 12% of the control by using an oil emulsion containing 10% (by weight) DDT and to 18% with 6% DDT. The first larvae appeared 24 days after treatment with an emulsion containing DDT and 9 days afterwards with an emulsion not containing DDT.

1171. SPILLER, D.

Truncated lognormal distribution of red scale (*Aonidiella aurantii* Mask.) on citrus leaves.

N.Z. J. Sci. Tech., Sect. B, 1952, 33: 483-7, bibl. 3.

The frequency distribution of red scales on citrus leaves is examined and data are tabulated from samples of 120 leaves from each of 30 trees. A TLN [truncated log-normal distribution] mean and TLN standard deviation has been calculated for each distribution, and after using these values as population parameters, it is shown that the data do not conflict with the hypothesis of truncated lognormal distribution. [From author's summary.]

1172. STEARNS, C. R., JR., AND OTHERS.

Progress report on concentrated sprays on citrus in Florida.

Proc. Fla St. hort. Soc. for 1951, pp. 64-6, bibl. 1.

Concentrated sprays, used experimentally for 3 years and commercially for 1 year, appear to give as satisfactory pest control as dilute sprays with all spray materials so far tested except oil. It is concluded that a practical ratio for concentrated sprays would be to use 6 times the concentration and one-eight the gallonage normally used for dilute sprays.

1173. GRIFFITHS, J. T., AND OTHERS.

Toxicology of parathion and other phosphatic insecticides and precautions for their use on citrus.

Bull. Fla agric. Exp. Stat. 479, 1951, pp. 24, bibl. 25, illus. [received 1952].

Complete recommendations for handling parathion in citrus groves include wearing approved respirators; changing clothes daily; taking a bath at the end of a day's work; wearing protective clothing such as a hat, rubber boots and rubber gloves; and taking a pre-employment medical examination. It is suggested that picking and pruning be deferred for not less than 14 days from the time of spraying a grove with parathion. [From authors' summary.]

1174. GRIFFITHS, J. T., AND OTHERS.

Health status of parathion when used on citrus in 1951.

Proc. Fla St. hort. Soc. for 1951, pp. 79-82, bibl. 2.

During the 1951 citrus spray season, 9 cases of parathion poisoning were confirmed by blood cholinesterase determinations. The use of blood tests at periodic intervals during parathion spray operations was shown to be very useful in preventing parathion poisoning. The use of concentrated sprays has increased the hazard for the man filling the supply unit. [From authors' summary.]

1175. STEARNS, C. R., JR.

Parathion residues on citrus foliage and in the peel of oranges.

Proc. Fla St. hort. Soc. for 1949, pp. 110-11 [received Nov. 1952].

The rapid loss of parathion from citrus foliage makes it safe to re-enter a grove within a few days. No parathion was found in the peel of oranges sprayed when under $\frac{1}{2}$ in. in diameter but with fruit over $\frac{3}{4}$ in. considerable quantities were absorbed. No applications should be made within 30 days of harvest.

1176. SITES, J. W.

Fruit quality studies—effect of timing of parathion sprays on internal quality of Pineapple oranges and Excelsior grapefruit.

A.R. Fla agric. Exp. Stat. for 1950/51, pp. 146-8.

Although oil sprays have given satisfactory scale control, it has been shown repeatedly that such sprays prevented the development of maximum soluble solids in citrus fruits. In a 3-year trial at the Florida Citrus Experiment Station analyses of Excelsior grapefruit and Pineapple oranges treated with oil and parathion have shown that parathion produces the better quality fruit,

irrespective of the time of application. The advantages of using parathion in preference to oil were more pronounced on oranges than on grapefruit, and preliminary calculations indicated that the higher cost of parathion was amply compensated by the higher quality oranges obtained.

1177. RIEHL, L. A., AND CARMAN, G. E.

Water spot of navel oranges.

Calif. Citrogr., 1952, 37: 464, 484-5, bibl. 2.

Counts of the water spot disorder of navel oranges in the 1951-52 season in 3 orchards and one experimental plot in Los Angeles County, Calif., showed the incidence to be lower among fruits from trees that had been sprayed with parathion 25% wettable powder than from comparable trees treated with oil sprays.

Citrus—harvesting, packing, storing and by-products.

(See also 1220f, 1, m.)

1178. HARDING, P. L.

Evaluating palatability in Florida citrus fruits.

Proc. Amer. Soc. hort. Sci., 1952, 59: 303-6, bibl. 5, reprinted in *Citr. Mag.*, 1952, 15 (3): 37-8.

A system of palatability ratings is described which shows a sufficiently close relationship with measurements of total solids and total acid to make it possible to construct nomographs for each kind of citrus fruit.

1179. SAVAGE, Z.

Boxes harvested, costs and returns on orange and grapefruit groves for 17 seasons, 1931-48.

Proc. Fla St. hort. Soc. for 1949, pp. 7-15 [received Nov. 1952].

The study, covering an average of 252 groves, provided information on ages of trees, boxes harvested per acre, costs of labour, power and equipment, fertilizers, spray and dust materials, and operating costs, returns and profit margins per acre. The data presented emphasize the considerable differences that exist between orange groves and grapefruit groves.

1180. MINZ, G.

The loss of weight in storage of Shamouti oranges. [Hebrew, with English summary 3 $\frac{1}{2}$ pp.]

Ktavim, 1950, Vol. 1, Hebrew pp. 199-209, bibl. 1, English pp. 45-8.

In trials over 4 years to determine methods of reducing weight losses during storage Shamouti oranges were subjected to various treatments including dipping in Brytene emulsions, wrapping in oil wraps, waxing by the Brogdex process, heating to 65-78° C. for 15-26 mins., and the customary wilting procedure in which the fruit is held for about 4 days before wrapping and packing. The fruit was subsequently stored for 20 to 33 days at different temperatures and humidities. Average weight losses were 4-5% after 3 weeks and 6-7% after 4 weeks storage. The results indicate that wilting prior to wrapping, though increasing the total loss of weight, reduces the loss following packing. This procedure is particularly desirable at the beginning of the season or after prolonged rain, although it may counteract the effects of decay control treatments now

in general use. Waxing reduced weight losses considerably. Relatively high storage temperatures and low humidities (18° C. and 85% RH) increased weight losses, especially where fruit had been roughly handled, whereas in saturated air the loss did not exceed 0.5% after 33 days storage. Large fruits lost less than small ones.

1181. STRICKLAND, A. G.

Diphenyl wraps.

Citrus News, 1952, 27: 114.

In 2 preliminary trials in South Australia in 1951, the use of diphenyl wraps markedly reduced penicillium rots and storage spot in oranges when compared with plain wraps. Further trials are in progress.

1182. HILL, E. C., AND FAVILLE, L. W.

Studies on the artificial infection of oranges with acid tolerant bacteria.

Proc. Fla St. hort. Soc. for 1951, pp. 174-7, bibl. 5, illus.

Acid-tolerant bacteria isolated from orange juice produced deterioration of tissue and high counts only when inoculated into the juice of the fruit. This fact suggests that natural infection of citrus fruit could be caused either by thorn injury or by insects capable of piercing the peel. The organisms, after being inoculated into the fruit on the tree, produced maximum counts within approximately three weeks and maintained high counts throughout the observation period of five weeks. There was little indication in the external appearance of the fruit that high counts were present. [From authors' summary.]

1183. SMITH, R. J.

"Volume fill" for citrus fruit.

Calif. Citrogr., 1952, 37: 462, 474, 476-7, bibl. 1, illus.

Successful commercial trials have been completed of the "volume fill" method of packing lemons which is almost entirely mechanical and produces a material saving in costs without detriment to the condition of the fruit. The main features of the system are a new container made of corrugated paper of one-half standard volume, accurate fruit sizing equipment, box filling equipment and a shaking device for settling the fruit in the boxes. The fruit is packed unwrapped and without a pattern or exact box count or weight. Similar trials are now being made with oranges. [For other studies on lemon packing see *H.A.*, 22: 2995 and 4285.]

1184. STEWART, W. S., PALMER, J. E., AND HIELD, H. Z.

Packing-house experiments on the use of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid to increase storage life of lemons.

Proc. Amer. Soc. hort. Sci., 1952, 59: 327-34, bibl. 12, being *Pap. Calif. Citrus Exp. Stat.* 712.

The storage life of Eureka lemons was increased by adding 100 to 1,000 p.p.m. of 2,4-D or 2,4,5-T to the wax emulsion applied just before storage. This effect was due mainly to a reduction in the number of fruits developing black button (blackened calyx) and alternaria rot. Both 2,4-D and 2,4,5-T also significantly reduced water loss of the fruit and the latter in particular

delayed the development of yellow colour. Where nitrogen trichloride gas was used, however, interaction with both growth substances resulted in rind staining. The ester and amine forms of 2,4,5-T seemed equally effective, but residues of the triethanolamine form were more persistent than those of the isopropyl or butyl esters.

1185. FLETCHER, W. A.

New Zealand citrus storage trials 1949 and 1951 seasons.

Orchard. N.Z., 1952, 25 (7): 3-5.

From the results of the trials described recommendations are given for cool storage of New Zealand grapefruit and of Meyer lemons. Fruit can be stored successfully at 43°-45° F. and 90% humidity, especially if it is treated with 2,4,5-T to reduce stem-end rots.

1186. LINCOLN, F. B.

Investigation of the proper maturity of Tahiti limes for marketing.

Proc. Fla St. hort. Soc. for 1949, pp. 232-8, bibl. 2 [received Nov. 1952].

In this preliminary study it has been found that there is a great variation in the yield of juice from individual limes of the same age or of the same size. Average values are not very representative of a random sample of limes. There has been no external character of the lime found by which the approximate yield of juice can be ascertained. The percentage of juice obtainable increases as the fruit increases in size. The increase in the available juice from stored fruit is largely accountable to shrinkage of the rind. [Author's summary.]

1187. MUSTARD, M. J.

Packaging and storage of Persian limes.

Proc. Fla St. hort. Soc. for 1950, pp. 228-36, bibl. 8 [received Nov. 1952].

Medium-sized Persian limes kept better when held at 48° F. for 3 weeks than when held at 48° F. for 1 week followed by storage at room temperatures or than when held throughout at room temperatures (67°-80° F.). Cool storage at 48° F. for 1 week followed by storage at room temperature proved of more benefit to packed limes of the largest sizes (48's) than to packed limes of the smallest sizes (100's and 110's). Perforated pliofilm and perforated cellophane bags proved better than other packaging materials, the former giving slightly better results than the latter in the case of small fruit. Latex VL-600 compared favourably with wax as a surface coating in a test on medium sized fruit.

1188. GATES, C. M.

The possibilities of 2,4-D for the control of post-harvest decay in Florida limes.

Proc. Fla St. hort. Soc. for 1949, pp. 220-2, bibl. 3 [received Nov. 1952].

Dipping Persian limes in concentrations of up to 2,000 p.p.m. 2,4-D reduced decay in storage, and spraying Idemore lime trees with concentrations of 16 to 64 p.p.m. 2 months before harvest tended to reduce losses through yellowing. Further tests should be made, however, before definite conclusions can be drawn.

1189. CONOVER, R. A.

Studies of stylar end rot of Tahiti limes.

Proc. Fla St. hort. Soc. for 1950, pp. 236-40 [received Nov. 1952].

Stylar end rot may occur on fruits before harvesting, in the interval between harvesting and packing, or while the fruit is in transit. The studies reported here indicate that: (1) there is no clear correlation between juice content and the breakdown; (2) large limes are more prone to stylar end rot than small; (3) more variation exists in the amount of rot developing in different lots of limes than among limes of different sizes or juice percentages; and (4) other conditions being equal, rot is more liable to develop during storage when temperatures and humidities are high.

1190. INSINGER, J. A.
Limette-olie. (Lime oil.)
Naarden Nieuws, 1951, 26: 1-2, from abstr.
in *DocumBl. trop. Prod. Amst.*, 1952, 7: 183.

The extraction and properties of the essential oil of lime are considered, in relation to the areas of production. Production figures are given for Trinidad and Tobago, Dominica, Montserrat, Jamaica and British Guiana, and lime culture in Florida is described.

1191. DRIGGERS, J. C., DAVIS, G. K., AND MEHRHOF, N. R.
Toxic factor in citrus seed meal.
Tech. Bull. Fla agric. Exp. Stats 476, 1951,
pp. 36, bibl. 18, illus. [received Oct. 1952].

Commercially prepared citrus seed meal proved toxic to poultry owing to the presence of a factor believed to be limonin, the bitter principle of the seed, with a second factor possibly contributing. A non-toxic meal, that proved satisfactory as a protein supplement for 5- to 6-week-old chicks, was produced by extracting dehydrated seed meal successively with diethyl ether, acetone and 95% ethyl alcohol.

Dates.

(See also 1220p.)

1192. CHEVALIER, A.
Recherches sur les *Phoenix* africains.
(Research on the African species of *Phoenix*.)
Rev. int. Bot. appl., 1952, 32: 205-36, bibl.
3 pp., illus.

This review article includes notes on the chief diseases of the date palm and a bibliography of all original papers and reviews on the subject published in the journal to date, with a short list of other important relevant publications.

1193. SMIRNOFF, W.
La cochenille du palmier-dattier dans les oasis du Maroc et le problème de sa répression. (The date-palm scale in the Moroccan oases and its control.)
Terre maroc., 1952, 26: 306-8, illus.

Parlatoria blanchardi appeared a few years ago in the Moroccan oases and is still spreading. It does serious damage, weakening infected trees by causing premature withering of the leaves, reducing the yield, and spoiling the fruit. In the Algerian and Tunisian oases where the scale has long been established it does not endanger the date harvest as it is kept under control by insect predators. Biological control is to be tried in Morocco.

Feijoa.

(See also 1091.)

1194. BAILEY, F. L.
Culture of feijoa trees.
N.Z. J. Agric., 1952, 84: 291-6, bibl. 3,
illus.

Notes are given on the fruit (*F. sellowiana*), location, soil, shelter, varieties, propagation (by cuttings, layering, and grafting on seedling stocks), soil preparation and planting, planting distances, pruning, manuring, pests and diseases, harvesting and packing. If soil and climate are suitable feijoas grow without special attention, and production costs are the lowest of any sub-tropical fruit grown in New Zealand.

Litchis.

(See also 1220b, d.)

1195. GROFF, G. W., AND LIU, S. Y.
Describing Florida varieties of lychee.
Proc. Fla St. hort. Soc. for 1951, pp. 276-81,
bibl. 12.

Measurements used in the description of litchi varieties are described and applied to 2 varieties as examples. Brief mention is made of the possible use of certain genetic characters and of the nature and development of the aril in work on the improvement of litchis. Varieties of litchi that have been introduced in the past to Hawaii and the U.S.A. are listed.

1196. COBIN, M.
Notes on the grafting of *Litchi chinensis* Sonn.
Proc. Fla St. hort. Soc. for 1948, pp. 265-8,
bibl. 5 [received Nov. 1952].

The literature on the vegetative propagation of litchis is briefly reviewed. Techniques which gave excellent results with approach-grafting and about 30% success with cleft-grafting are described. Side-veneer grafts were unsuccessful. A note by G. W. Groff on Chinese practice is appended.

Macadamia nuts.

1197. ROSS, A. A.
Nut crops.
Qd agric. J., 1952, 75: 21-34, illus.

In Queensland, the macadamia nut, the walnut and the pecan are grown on a limited scale. Of these the first, an indigenous tree, is here given special attention. There are two recognized varieties, the type species and its variety *integrifolia*; they differ in leaf characters. There is a tendency for *integrifolia* to blossom from June through to March and some strains are almost ever-bearing; *ternifolia* blossoms between August and October and produces one main crop. Between these two types there are numerous intermediate forms varying in spininess of leaves, colour of flower, size of nut and thickness of shell. Strains selected for vegetative propagation are grouped according to thickness of shell. Notes are given on climatic and soil requirements, propagation, preparation of land and planting, pruning, nutrition, cultivation, harvesting, shelling, and yields. Grafting is relatively difficult owing to the hardness

of the wood; the best results have been obtained when the seedling rootstocks are side-wedge grafted. Budding is usually much less satisfactory than grafting. Grafting should be carried out at a time when starch accumulation in the wood is at a peak, which is after the fruit has been harvested and before blossoming. In several orchards zinc deficiency has been reported, the symptoms being small, yellowish, sometimes slightly mottled leaves which are bunched fairly close together; the affected trees crop poorly and shoot growth is retarded. The disorder can be corrected by the application of Zn foliage sprays. Short descriptions are given of the cultivation of walnuts and pecans in Queensland. The most popular scab resistant pecan varieties are Stuart, Farley, Desirable and Curtis.

Olives.

(See also 149, 1220a, k, s.)

1198. MARINUCCI, M.
Research on the olive. [Italian.]
Olivicoltura, 1952, No. 1, from abstr. in
Bol. Oleic. int., 1952, 2 (6): 80.
 A review of recent research on self sterility, self fertility and ovary abortion, on pruning, hybridization, fertilization and phytopathology.
1199. CASTORINA, S.
The biology of grafted olives [Italian.]
Olivicoltura, 1952, No. 4, from abstr. in
Bol. Oleic. int., 1952, 2 (8): 90.
 A description is given of experiments at Pescara on the physiology of nutrition, growth and fruiting, including a study of the concentration of sap from the leaves and fruit branches in spring, summer, autumn and winter, the quantity of sap obtained from a given quantity of leaves and the seasonal variation of its N content, and the respiration of the leaves and fruit branches.
1200. JACOBONI, N.
Le olive da mensa. (Table olive growing [in Andalusia].)
Ital. agric., 1952, 89: 379-86, bibl. 5, illus.
 In the dry olive areas of Andalusia water is conserved by frequent summer cultivations. In plantations of the table varieties, Gordal and Manzanilla, half the area receives intensive cultivation each year and forcing is used to obtain export quality fruit while the other half is rested. Forcing consists of the heaping of earth round the base of the trunk, a practice which attracts water from the surrounding area by capillarity, protects the base of the trunk from the sun and prevents the growth of basal shoots. Olive propagation is by large grafted cuttings 2 m. long and 8-10 cm. in diameter (estaca), by smaller grafted cuttings 50-70 cm. long and 3-4 cm. in diameter (garrote), by root grafting and by grafting on seedlings. The large cuttings are obtained during formation pruning and must be planted when dormant. They are stored in sand in a dry place and planted out in February wrapped with sackcloth daubed with mud to about 20-30 cm. from their top, about one-third of the length of the cutting being below ground, and grafts from 15-month-old branches inserted. Large trees are also top-worked, the branches being treated in succession at 2-year intervals.

1201. MORETTINI, A., AND ARMELLINI, S.
 Primo contributo allo studio delle varietà di olivo coltivate nella provincia di Ascoli Piceno. (A first contribution to the study of the varieties of olive cultivated in Ascoli Piceno province.) [English summary $\frac{1}{2}$ p.]
Ann. Sper. agrar., 1952, 6: 1093-115, bibl. 14, illus.
 Notes are given on the floral biology, fruiting, ovary abortion, self-fertility and self-sterility, and general characters of the 10 principal varieties.
1202. HARTMANN, H. T.
Further studies on the propagation of the olive by cuttings.
Proc. Amer. Soc. hort. Sci., 1952, 59: 155-60, bibl. 3, illus.
 In rooting soft wood olive cuttings, in glass-covered frames with bottom heat controlled at 73° F., better types of root system developed in such media as Sponge Rok, vermiculite plus Haydite or peat moss plus Haydite than in sand. Using the concentrated solution-dip method of application indolebutyric acid (IBA) gave almost as good results at 3,000 and 7,000 p.p.m., 4,000 and 5,000 p.p.m. being the optimum concentrations, as did the low-concentration soaking method. For rooting hardwood cuttings soaking in either IAA or IBA at 12 p.p.m. for 24 hours followed by callusing for 30 days in moist sawdust resulted in excellent root and shoot regeneration; treatment with vitamin B₁ before planting the cuttings had no effect.—Univ. Calif., Davis.
1203. CAROCCI BUZZI, C.
The effect of cultivation of olive trees on the yield and quality of the oil. [Italian.]
Olivicoltura, 1951, No. 12, from abstr. in
Bol. Oleic. int., 1952, 2 (6): 80.
 Experiments showed that olives from uncultivated or little cultivated trees have a higher fat content and better quality oil than those from intensely cultivated trees, a result that accords with the common belief in Italy.
1204. CAROCCI BUZZI, C.
The technique and economics of irrigation and the fertilization of olive plantations by means of irrigation. [Italian.]
Olivicoltura, 1952, No. 2, from abstr. in
Bol. Oleic. int., 1952, 2 (7): 77.
 The 3 chief considerations in the irrigation of olive plantations are the soil bacterial flora, the structure and nature of the soil, and the method of applying the water. The problem of applying fertilizers by dissolving them in the irrigation water and its economics are discussed and the results of an experiment on this subject given.
1205. MARINUCCI, M., AND JACOBONI, N.
 La renovación de las hojas del olivo por medio del "descortezado anular". (Olive foliage renewal by ring-barking.)
Feuilles Inf. oléic int., 1952, No. 2, from abstr. in *Bol. Oleic. int.*, 1952, 2 (9): 62.
 The reconstitution of the foliage of the olive can be achieved by ring-barking (but not by simple ringing). Techniques for use with the additional object of increasing yield are described and the results of experiments are given.

1206. MORT, C. H.

Fruitfulness in olives.

Agric. Gaz. N.S.W., 1952, 63: 371-2, bibl. 1.

The chief factor in blossom formation and development in the olive, under investigation at Wagga Experiment Station, appears to be the nutritive condition in the tree during the previous season. An "on crop" year results in a deficiency of carbohydrates for fruit bud development. This can be partially corrected by pruning but attention to all aspects of nutrition is important, particularly soil moisture supply and the maintenance of a favourable N balance.

1207. HARTMANN, H. T.

Spray thinning of olives with naphthalene-acetic acid.

Proc. Amer. Soc. hort. Sci., 1952, 59: 187-95, bibl. 9.

Trials have been in progress in California on the spray thinning of several varieties of olive since 1946, and the results of 1950 and 1951 experiments are given here. Among various compounds tested as post-bloom sprays only NAA has proved satisfactory, the best response being obtained from 100-125 p.p.m. in a 1½% light medium summer oil applied 14-25 days after full bloom. At concentrations of 150 p.p.m. and over injury to terminal buds occurred. Spraying with NAA at 40-50 p.p.m. at full bloom also reduced set, but this treatment is not recommended, because the need for thinning cannot be predicted at that stage. Fruit thinning has resulted in increased fruit size, increased flesh/pit ratio, higher oil content, earlier fruit maturity and a reduction in biennial bearing tendencies.

1208. PASTORES, R.

The olive and low temperatures. [Italian.]
Olivicoltura, 1952, No. 4, from abstr. in
Bol. Oleic. int., 1952, 2 (8): 89-90.

In Bari Province in 1949 late frost (−9.5° C.) caused death of buds, leaf fall (up to 60%), scattered lesions on branches of 2-5 years old, death of young shoots and splitting of the branch bark.

1209. HARTMANN, H. T., AND VAN HOOK, D.

Olive freeze-injuries.

Calif. Agric., 1952, 6 (10): 4, 15-16.

Freezing makes olives unsuitable for pickling but does not affect their oil content. Tests on Mission olive fruits showed that detached fruits were less subject to freezing injury than fruits left on shoots. When fruits were cooled to 8°-10° F. below their freezing point in many cases no injury occurred, because at the stage at which ice crystals started to form temperatures in the fruits rose abruptly to 24°-27° and occasionally to 29° F. Dry fruits proved much more resistant to freezing than wet, and black fruits than green. Shaking fruits to simulate wind effects intensified freezing injury. Limited tests with other varieties showed their behaviour to be similar to that of Mission.

1210. BRAGHI, A.

Sul deterioramento degli ulivi del Lazio e del Garda. (A disorder of olive trees in Lazio and Garda.)

Olearia, 1952, 6: 234-7, bibl. 7, illus.

The "new" disease reported in the Lake Garda district [see *H.A.*, 22: 2291] is considered to be identical with

one which has been observed for many years in the Province of Lazio. The symptoms are apical chlorosis of the previous year's leaves on some branches, the fall of these leaves and the desiccation of the branches carrying them. The cambium produces abnormal cells. The incidence of the disorder varies from year to year and is believed to be related to the occurrence of unfavourable edaphic conditions.

1211. NICOLINI, J. C.

La podredumbre de las raíces del olivo. (Root rot of olive.)

Alm. Minist. Agric., B. Aires, 1951-52, 1951, pp. 319-20, from abstr. in *Rev. appl. Mycol.*, 1952, 31: 338.

Olive root rot (*Rosellinia necatrix*), which is widespread in Argentina, is described, and instructions are given for its control in plantations by cultural methods, including the eradication and burning of diseased trees, which should be surrounded by a trench 40 to 50 cm. deep, the diameter varying with the age of the tree. The roots extend horizontally for a distance two or three times the height of the tree; the soil within this radius may be disinfected with quicklime (½ kg. per sq. m.), uspulun universal at 0.25%, using 5 l. per sq. m., sodium arsenite at 2% (10 l. per sq. m.), or sulphur dust at ½ kg. per sq. m. Such soil treatment is expensive and would be profitable only where a few trees are involved.

1212. CIPOLLA, G.

Comprobaciones del ataque de *Cercospora* al olivo. (Observations on *Cercospora* attacking olives.)

Idia, 1952, 5 (52): 1-3, bibl. 4, illus.

An unusual spotting of the leaves and young fruits of olive was observed at the Central Experimental Station, Castelar, Argentina. The fungi *Cercospora* sp. and *Alternaria tenuis* were isolated from infected material. The symptoms were reproduced by reinoculation with *Cercospora*, but when the inoculated leaves were unprotected the wounds always became infected with *Alternaria* as well. Observations suggest that the *Cercospora*, sp. is not *C. cladosporioides*, the common olive pathogen. The control measure recommended is periodic spraying with 1% bordeaux mixture as the new growth develops.

1213. NICOLINI, J. C.

Dos cepas de bacterias que producen cáncers similares a los de la "tuberculosis del olivo". (Two strains of bacteria that produce cancers similar to tuberculosis of olive.)

Idia, 1952, 5 (52): 4-5, bibl. 4.

Two strains of bacteria isolated from olive tumours identical with those caused by *Pseudomonas savastanoi* were sent from Rome to the Institute of Plant Protection, Buenos Aires. They were there compared with 2 strains isolated from "tuberculosis" tumours in Argentina. The tumours induced by all 4 strains were macroscopically and histopathologically identical. The Argentinian strains were identified as *P. savastanoi* while the Italian strains were shown to be an unknown species of *Pseudomonas* differing in cultural behaviour from the former in that they reduced nitrates and dissolved gelatine.

1214. CARRANTE, V., FENICIA, M., AND DE DONNO, S.
Esperienze di oleificio eseguite nel 1950.
(Olive oil extraction experiments in 1950.)
[English summary $\frac{1}{2}$ p.]
Ann. Sper. agrar., 1952, 6: 263-304, illus.

A description is given of trials with the Sculco apparatus (surface tension action without grinding or pressing) and the Superpress (grinding and pressing). Yield was lower with the former (18.24 kg. per quintal as compared with 19.21) but the quality was better.—Agric. exp. Stat., Bari.

Passion fruit.

1215. FLETCHER, W. A.
Passionfruit culture.
Bull. N.Z. Dep. Agric. 135, revised 1952,
pp. 11, bibl. 6, illus.

The cultivation of passion fruit, *Passiflora edulis*, in New Zealand is described with respect to sites and soils, windbreaks, soil preparation, seed selection, raising seedlings, trellising, planting, training, pruning, cultivation, manuring, irrigation, picking, packing in standard No. 6 and No. 8 cases, and disease and pest control.

Persimmons.

1216. SCARAMUZZI, F.
Ricerche sulle cause d'insuccesso dell'in-
nesto "ad occhio dormiente" nel kaki.
(Research on the cause of failure in the bud-
ding of persimmon.) [English summary $\frac{3}{4}$ p.]
Ann. Sper. agrar., 1952, 6: 805-29, bibl. 9,
illus.

Anatomical investigation showed that the low % success is due to the fact that cambial union does not extend all round the shield but occurs only in isolated places or even at a single point.—Inst. Tree Cult., Florence.

1217. YOKOZAWA, Y.
Insect visitors on the flowers of Japanese
persimmon. (The second report.) [Japanese,
with English summary 13 lines.]
J. hort. Ass. Japan, 1952, 21: 25-8, bibl. 5.

Studies on the efficiency of the honey-bee in the pollination of the Japanese persimmon showed that female flowers situated near male flowers were better pollinated than those farther away.

Tung.

1218. MERRILL, S., JR., AND KILBY, W. W.
Effect of cultivation, irrigation, fertilization,
and other cultural treatments on growth of
newly planted tung trees.
Proc. Amer. Soc. hort. Sci., 1952, 59: 69-81,
bibl. 9.

In 1947 and 1948 various cultural treatments were applied to newly transplanted tung trees at the Mississippi Experimental Tung Farm, White Sand. Total linear growth and trunk size benefited from irrigation, hoeing, or mulching with clover hay or tung hulls. The beneficial effect of hoeing without irrigation was correlated with higher soil moisture, and was more marked in 1947 when 14.98 in. rain fell in May to July,

inclusive, than in 1948 when only 7.83 in. fell. When more than 50% of the total available soil moisture had been exhausted growth was checked. In the second year mulching was more effective than hoeing in promoting growth in non-irrigated trees. Grass and weeds markedly depressed growth even with irrigation. Control of weeds with a herbicide promoted growth equivalent to that of hoed, non-irrigated trees. It is concluded that the depressing effect of grass and weeds was due mainly to depletion of available moisture, but the exceptionally good growth of unirrigated, mulched trees suggests that there are also other important factors involved.

1219. NEARPASS, D. C., AND DROSDOFF, M.
Potassium, calcium, and magnesium in tung
leaves as related to these ions in the soil.
Soil Sci., 1952, 74: 295-300, bibl. 15.

Leaf K was not significantly correlated with milli-equivalents of K in the soil but was highly significantly correlated with the percentage saturation of K in the soil. Leaf Ca was highly significantly correlated with m.e. of Ca in the soil and the correlation with the degree of saturation of Ca was even greater but the increase did not attain statistical significance. The correlation coefficient, +0.72, between leaf Ca and the ratio of Ca to K plus Mg in the soil was highly significant. Leaf Mg was not significantly correlated with soil Mg on the basis of either m.e. or percentage saturation but for leaf samples in which the Mg was less than 20 m.e./100 g. a highly significant correlation was found with the degree of Mg saturation of the soil. Leaf Mg was negatively correlated, to a highly significant degree, with the percentage saturation of K in the soil.

Noted.

1220.
a BALDINI, E., AND GUCCIONE, G.
Osservazioni su di una razza di olivo con
antere sterili. (Notes on a [Sicilian] variety
of olive with sterile anthers.) [English sum-
mary 7 lines.]
Ann. Sper. agrar., 1952, 6: 1205-16, bibl.
28, illus.
b BANTA, E. S.
The lychee.
Amer. Fruit Gr., 1952, 72 (10): 10-11, 20-1,
illus.
In Florida.
c ČAIŁAHJAN, M. H., AND NEKRASOVA, T. V.
The influence of ringing on the development
of dormant and grafted buds of citrus plants.
[Russian.]
Doklady Akad. Nauk S.S.S.R., 1952, 82:
653-6, bibl. 4, illus.
d CHEN, W. H.
The culture of the lychee.
Proc. Fla. St. hort. Soc. for 1949, pp. 223-6
[received Nov. 1952].
In China.
e CHILDS, J. F. L.
Rio Grande gummosis: its occurrence in
Florida citrus.
Proc. Fla. St. hort. Soc. for 1950, pp. 32-6,
bibl. 6 [received Nov. 1952].

- f COOK, R. W.
A rapid method for the determination of peel oil in citrus juices.
Proc. Fla St. hort. Soc. for 1951, pp. 134-5, illus.
- g DUCHARME, E. P.
Xyloporosis of citrus.
Proc. Fla St. hort. Soc. for 1951, pp. 57-60, bibl. 9, illus.
[See *H.A.*, 22: 2970.]
- h ESDORN, I.
Über die Entwicklung des Citrus-Anbaues in Marokko. (The development of citrus growing in Morocco.)
Angew. Bot., 1952, 26: 197-200, bibl. 2.
- i EWART, W. H., AND ELMER, H. S.
Use of dieldrin for the control of citrus thrips.
Calif. Citogr., 1952, 37: 356, [372 (adapted from *News Lett.*, Div. Ent. Calif. *Citrus Exp. Stat.* 56) and *Calif. Agric.*, 1952, 6 (9): 15. *Scirtothrips citri*.
- j HATTORI, S., SHIMOKORIYAMA, M., AND KANAO, M.
Studies on flavanone glycosides. IV. The glycosides of ripe fruit peel and flower petals of *Citrus aurantium* L.
J. Amer. chem. Soc., 1952, 74: 3614-15, bibl. 7.
- k JACOBONI, N.
On olive buds. [Italian.]
Olivicoltura, 1951, No. 12, from abstr. in *Bol. Oleic. int.*, 1952, 2 (6): 79.
A review of recent research.
- l LINS, D. M.
Marketing limes and lime by-products.
Proc. Fla St. hort. Soc. for 1951, pp. 271-3. Notes on the expanding Florida lime industry.
- m MACDOWELL, L. G.
Productos de los agrios. (Citrus products.)
Hacienda, N. Y., 1952, 47 (4): 54-5, illus. In Florida.
- n MASTE GOWDA, M. C.
The cultivation of avocado pear in Mysore State.
Mysore agric. J., 1952, 28: 1-7, bibl. 6, illus.
- o OBERDORFER, E.
Beitrag zur Kenntnis der Nordägäischen Küstenvegetation. (The coastal vegetation of the Northern Aegean.)
Vegetatio, 1952, III (1951): 329-49, bibl. 10, illus.
- p PEREAU-LEROY, J.
Note sur le palmier dattier au Fezzan. (Note on the date palm in the Fezzan.)
Fruits d'Outre Mer, 1952, 7: 129-31, illus.
- q POWELL, H. R.
Citrus-growing in Western Australia: the 1952 crop reviewed.
J. Agric. W. Aust., 1952, 1 (n.s.): 307.
- r SCHULTZ, E. F.
Almácigos de citrus. (Citrus nurseries.)
Idia, 1952, 5 (52): 6-8, illus.
Methods advocated in Argentina.
- s SPINA, P.
Osservazioni sulla morfologia e biologia del fiore dell'olivo in Sicilia. (Observations on the morphology and biology of the flowers of the olive in Sicily.) [English summary 12 lines.]
Ann. Sper. agrar., 1952, 6: 635-50, bibl. 21, illus.
Of certain varieties at Acireale Experimental Station.
- t STEYAERT, R. L.
La "tristeza" des agrumes. (Tristeza of citrus.)
Bull. agric. Congo belge, 1952, 43: 399-446, bibl. 5½ pp., illus.
A detailed review.
- u STURROCK, D.
The karanda as a commercial fruit.
Proc. Fla St. hort. Soc. for 1948, pp. 289-91 [received Nov. 1952].
Carissa carandas in Florida.
- v WAIBEL, C.
The program of certification of citrus budwood.
Proc. Fla St. hort. Soc. for 1951, pp. 39-42. A plea for certification with special reference to psorosis control.
- w YOUNG, T. W.
The economy of adequate drainage for citrus in Florida coastal areas.
Proc. Fla St. hort. Soc. for 1951, pp. 60-4.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 69, 1093, 1368g, u, 1369b, k, 1397, 1398, 1403, 1405, 1408-1412, 1418, 1419, 1423, 1425, 1427a, b, c, h, i.)

- 1221.* AKENHEAD, D., AND ARGLES, G. K.
Some problems of tropical horticultural research.
[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7.

* See note, p. 3.

Tropical horticultural research is of recent origin. The pattern of organization which is evolving is similar to that followed in temperate climates. There are many 1-crop stations. Investigation of several crops at one station might lead to greater efficiency and offset the rising cost of modern experimentation. Vegetables remain largely unimproved. Their genetical problems and initial selection might well be entrusted to a few selected centres. Problems of the dissemination of information are discussed. The co-operation of research workers and information services in greater selectivity of published work is essential.

1222.* POPENOE, W.

The development of tropical American pomology.[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 8.

During the half-century reviewed in this paper great progress has been made in banana cultivation, through the use of soil surveys, drainage investigations, better propagating material, optimum plant populations, better irrigation, and the control of diseases. The avocado has been put upon a sound commercial basis (though principally in sub-tropical rather than purely tropical regions) through vegetative propagation, systematic study of varieties, their classification upon a natural basis and investigation of cultural problems. Such fruits as apples, peaches, plums, pears, and strawberries are suited to tropical highland regions, when proper attention is given to chilling requirements and other factors, and their cultivation is extending. Of the citrus fruits, the Washington or Bahia Navel orange, propagated vegetatively, is now being cultivated in many countries on a limited scale. Insect pests, diseases, and rootstock problems require investigation. The cultivation of fine grafted mangoes from India and other parts of tropical Asia is extending gradually, while other Asiatic fruits such as the mangosteen, the lychee, and the kaki or Japanese persimmon have shown that they are adapted to many parts of tropical America. Grapes of the type grown in the Eastern part of the United States are proving more successful than varieties of *Vitis vinifera*. Some of the sapotaceous fruits are promising; the papaya, a popular breakfast fruit, gives trouble because seedlings are so variable. [Author's summary.]

1223.* EVANS, G.

Some account of variety collections of tropical agricultural crops and of the problems involved.[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10.

The author stresses the necessity for plant collecting and collections to aid the breeder in the tropics. It is essential that research institutes should co-operate in promoting them. A short account is given of some of the more important collections. The desirability of maintaining them in a healthy state is underlined and it is suggested that the work should be co-ordinated by central bodies as has been done for cereal crops by F.A.O.

1224. ROY, R. S.

A consolidated report of the fruit research scheme, Bihar, from 2nd April 1934 to 31st March 1951, 1952, pp. 56.

The objects of the scheme, which was initiated in 1934 and terminated in 1952, were to study fruit problems, especially the selection of the best types of mango, litchi, papaw and banana, and to formulate a manurial schedule for mango in the different parts of Bihar. Other fruits studied were guava, loquat, jamun, custard apple, sapota, peach, grape, fig, apple, pear, pomegranate and khirnee. The cause of alternate bearing in the mango was determined and the tree can now be induced to flower annually by cultural operations only. An adult mango requires manuring in the ratio

* See note, p. 3.

1:0:0:27:1:1 for healthy growth, the dose of N being 1.67 lb. per annum, with an extra 1 lb. N just after harvesting in heavy bearing years. The manurial requirements of other fruits have also been determined and suitable strains have been selected and multiplied. Propagation methods have been improved. Two of the chief fruit pests of Bihar, mango hoppers and litchi mites, can be controlled with DDT. Brief notes are given on the main technical projects undertaken.

1225. JARAMILLO ARANGO, R.

Monografías botánicas. (Botanical monographs.)

Rev. Fac. nac. Agron. Colombia, 1952, 12: 247-417, bibl. extensive.

Brief monographs, dealing with such subjects as taxonomy, names, history, origin, morphology and uses, are given on the following plants: avocado, capsicum, *Arracacia*, fibres, *Bombax*, palms, cherimoya, *Phaseolus* beans, granadilla, soursop, pomegranate, maize, *Rhus striata*, sandbox tree (*Hura crepitans*), citrus, pineapple, cacti, banana, roses, *Inga*, tobacco, calabash and wheat.

1226. [CONGO-BELGE.]

Contribution à l'étude du problème de l'économie rurale indigène au Congo belge. (Studies on the problem of native rural economy in the Belgian Congo.)

Bull. agric. Congo belge, Numéro spéc. 1952, 43, pp. 267.

This special number of the Bulletin consists of 15 papers, 13 of which were presented by the Belgian delegation to the International Conference on native rural economy held at Jos, Nigeria, in November, 1949. The papers are concerned with various aspects and problems of peasant society in the Congo.

1227. BURROWES, W. D.

Sample survey of production of selected agricultural products 1950.

Bull. Dep. Agric. Jamaica 48 (n.s.), 1952, pp. 65, bibl. 47.

In 1948 the Food and Agriculture Organization of the United Nations decided to undertake a World Census of Agriculture for the year 1950, and this publication describes the response of Jamaica. Farms were classified into 104 groups according (a) to the 13 parishes of the island and (b) to one of eight size groups. In each parish the proportion of farms sampled varied from $\frac{1}{10}$ of those of the smallest size to all those covering 500 acres or more. For ginger and rice, which are localized in their distribution, special arrangements were made. Full details are given of organization and the results obtained. S.C.P.

1228. ANTICHAN, C.

Les plantes de couverture dans la protection du sol en verger Guinéen. (Cover crops for Guinea plantations.)

Fruits d'Outre Mer, 1952, 7: 339-41, illus.

A list is given of 23 erect and 16 creeping leguminous plants suitable for use as cover crops, and amount of seed necessary per ha., average height, resistance to drought and tolerance to cutting back. For middle Guinea the most satisfactory species are: erect—*Cajanus indica*, *Indigofera sumatrana*, *I. geminata*, *Tephrosia candida*, *T. erembergiana*, *T. vogelii*, *Crotalaria striata*, and *C. anagyroides*; creeping—*Calopogonium mucun-*

oides, *Centrosema pubescens*, *Desmodium ovalifolium* and *Pueraria javanica*.

1229. VAIDYANATHAN, L. V., KUPPUSWAMY, S. V., AND CHOKKANNA, N. G.
Green manures and coffee.
Indian Coffee mon. Bull., 1952, **16**: 170-2.

Analyses of leaves and stems from 10 green manure and cover crop species are tabulated with respect to C/N ratio (to indicate rates of decomposition), leaf/stem ratio, N, P₂O₅ and K₂O. Taking these and other factors into consideration the best species would appear to be *Crotalaria striata*, *C. grahamiana* and *Tephrosia vogelii*. It remains to compare the bulk of material produced by each.—*Indian Coffee Bd Res. Stat.*, Balehonnur.

1230. CLÉMENT, P.
Les nématodes nuisibles aux cultures fruitières tropicales. (Nematodes injurious to tropical fruit crops.)
Fruits d'Outre Mer, 1952, **7**: 424-35, bibl. extensive, illus.

This review article covers the following aspects of the subject: general characters, habitats, classification, important genera, biology of the sedentary, semi-sedentary and migratory types, economic importance, interaction of plants and parasitic nematodes, control.

1231. ANKERSMIT, G. W., AND VAN DER LAAN, P. A.
Resultaten van proeven met insecticiden ter bestrijding van insectenplagen in de landbouw in Indonesië. (Results of trials with insecticides for the control of agricultural pests in Indonesia.) [English and Indonesian summaries 2 and 3 pp. respectively.]
Landbouw, 1951, **23**: 423-84, bibl. 41, illus.

In a short review of the various insecticides available it is pointed out that the organic phosphorus compounds are not suitable for use in Indonesia owing to the difficulty of taking adequate precautions against toxicity. Results are then given of extensive laboratory and field experiments with the various insecticides. The field experiments were carried out on pests of 28 crops, including coconuts, oil palms, citrus, cabbage, shallots, egg plants, cucumbers, gladioli, coffee, tea, cacao, cloves, tobacco, peppers, and green manure crops. Information is given on the use of equipment, the relative advantages of spraying and dusting and the dosages employed.

1232. MUSTARD, M. J., AND STAHL, A. L.
The freezing preservation of some tropical and subtropical fruits.
Proc. Fla. St. hort. Soc. for 1948, pp. 275-9, bibl. 4 [received Nov. 1952].

Various satisfactory frozen pack products prepared from mangoes, avocados, litchis, Barbados cherries, guavas, bananas and pineapples are described.

Bananas.

(See also 128, 1099, 1285, 1368f, 1369c, m.)

1233. REYNOLDS, P. K.
Earliest evidence of banana culture.
J. Amer. orient. Soc. 1951, **Suppl. 12**, pp. 1-28, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, **7**: 156.

A study is made from evidence found in literature and sculpture of the origin and spread of the banana.

1234. MESA BERNAL, D.
Lexicografía de nuestros plátanos y bananos. (Lexicography of plantains and bananas.)
Agric. trop. Bogotá, 1952, **8** (9): 27-33, bibl. 6.

Information is given on the meaning and origin of the names of some banana and plantain varieties, especially those used in Colombia, and the meaning of words used to describe certain plant characters.

1235. MONTSERIN, B. G.
The cultivation of bananas and plantains [in Trinidad and Tobago].
J. agric. Soc. Trin. Tob., 1952, **52**: 242-68, illus.

The factors which have limited the banana export industry in Trinidad and Tobago in the past are being overcome, Panama disease by the use of the immune Lacatan and leaf spot by fungicidal spraying. Plantains are grown to some extent but not in sufficient quantity to satisfy local demand. The paper includes sections on climate and soil, planting material and planting, cultural treatment, desuckering, manuring, harvesting and the major pests.

1236. SIMMONDS, N. W.
The strength of banana petioles in relation to ploidy.

Ann. Bot. Lond., 1952, **16**: 341-7, bibl. 4.

The strength of the banana petiole has been measured as the breaking strength corrected by covariance for the weight of the lamina it bears. Strength is less in triploids than in diploids and still less in tetraploids, thus agreeing with the field observation that polyploids have weaker leaves than diploids. There are also differences between plants of different specific origins (clones of *Musa acuminata*, *M. balbisiana* and their hybrids were used). Subsidiary results concern the weight of the leaf and the leaf index (length/breadth) in relation to ploidy.—*Banana Res. Scheme, Imp. Coll. trop. Agric., Trinidad, B.W.I.*

1237. SIMMONDS, N. W.
Experiments on the pollination of seeded diploid bananas.)
J. Genet., 1952, **51**: 32-40, bibl. 7.

A method is described for comparing the yields of seed given by different pollens on seeded diploid bananas by adapting the form of the bunch to a randomized block experiment. The results of fifteen experiments are recorded and show that a remarkably accurate discrimination of pollen effects can sometimes, though not always, be achieved. The method has considerable value for the study of relationships at the intraspecific level. Thus *Musa balbisiana* and *M. acuminata* are shown to be considerably differentiated and, in the latter species, the results accord very well with established cytogenetic and taxonomic knowledge. In both *M. balbisiana* and *M. acuminata* it was found that pollination by a closely related clone gave higher yields of seed than self-pollination; this was taken to indicate that the clones used were heterozygous for deleterious recessives, homozygous zygotes produced by selfing suffering elimination in development. [Author's summary.]—*Banana Res. Scheme, Imp. Coll. trop. Agric., Trinidad.*

1238. BOREL, E.

L'amélioration de la culture du bananier au Cameroun. (The improvement of banana culture in the French Cameroons.)

Fruits d'Outre Mer, 1952, 7: 222-30.

In experiments with different suckering techniques at different spacings with Gros Michel the last of the 4 following treatments was the best: (1) planting distance 5×5 m. (400 plants/ha.), 3 fruiting stems per plant, one sucker per stem after 6 months and one replacement sucker per stem in the month before harvesting; (2) 4×4 m. (625/ha.), one fruiting stem per plant, the first sucker after 4 months, a second after 8 months, and a replacement sucker in the month after harvesting; (3) 3.33×3.33 m. (901/ha.), one fruiting stem per plant, one sucker after 6 months, and a replacement sucker in the month before harvesting; (4) 2.85×2.85 (1,230/ha.) with the same sucker arrangement as (3). In experiments with Gros Michel to determine the best planting date yields were highest during the first 3 years when planting had occurred between 15 March and 15 April. In a replicated 6-level fertilizer experiment with Gros Michel the formulation which gave the highest yield was 1-5-2 (approximately 500 kg. each of sulphate of ammonia and dicalcium phosphate and 1,100 kg. K sulphate per ha.); a second experiment confirmed the crop's high K requirements. In propagation experiments with Gros Michel, stems cut back to 0.6 m. above the collar after fruiting gave good suckers but were too heavy for convenient transport while whole suckers gave better results than cut-back suckers. On the principle that degree of compactness of the fruit bunch is one of the most representative characters of a given type, Gros Michel plants farthest from the average were taken in the selection of mutants, with the aim of isolating new types. In experiments with *M. sinensis* March/May proved the best planting time, and in spacing trials 2×3 m. gave the highest yield followed by 2×4 , 3×3 and 3×4 . Future experiments are also discussed.—I.F.A.C.

1239. BRUN, J.

Le "bleu" du bananier en Guinée française. (The "blue" disease of bananas in French Guinea.)

Fruits d'Outre Mer, 1952, 7: 324-9, bibl. 2, illus.

This disease, which has caused considerable losses in plantations receiving heavy applications of fertilizer, disappeared when Mg was applied and appears to be due either to a deficiency of Mg or to a Mg/K disequilibrium. Its chief symptoms are violet lines and bands on the older leaves, and root withering. Fruits from infected plants rot quickly.—I.F.A.C. centr. Stat., Guinea.

1240. WALLACE, G. B.

Wilt or Panama disease of banana.

E. Afr. agric. J., 1952, 17: 166-75, bibl. 6, illus.

The presence of Panama disease (*Fusarium oxysporum f. cubense*) in the Moshi district of Tanganyika has been confirmed. The symptoms of the disease, its dissemination and control are described. Resistant varieties are being sought. The prevention of spread by uprooting and burning or by oil treatment has proved unsatis-

factory and attention is now being paid to the use of hormone weedkillers on affected plants and their neighbours. A locally designed injector is described and formulae are given for MCPA and 2,4-D. Brief descriptions are given of other diseases which may sometimes be confused with Panama disease.

1241. GUYOT, H., AND OTHERS.

Les traitements chimiques des hampes et la pourriture des régimes de bananes. (Chemical treatment of fruit stem rot in bananas.)

Fruits d'Outre Mer, 1952, 7: 380-4, bibl. 2.

In previous studies [see *H.A.*, 22: 1869-70] curative fungicidal treatment proved of little value and the influence of the physiological condition of bunches on their resistance to rot was studied. Further experiments in curative treatment in Martinique gave negative results but at Paris phenyl mercury nitrate, salicylic acid and lauryldiethylammonium chloride were each found to delay the development of rot considerably. Four compounds had previously been recommended for curative treatment: cuprous oxide, oxyquinoline sulphate, borated vaseline and methylene blue. Later a mixture of the 2 last was found to have little effect as a cure but to be of considerable value as a preventive. It was concluded that there is little need for protective measures provided the bunches come from vigorous plants and travel under good conditions, but that fungicides have a considerable, though not complete, action on bunches weakened by bad conditions of cultivation and transport.—I.F.A.C., and Crop Prot. Lab.

1242. STEINER, L. F., AND HINMAN, F. G.

Field tests of insecticides for control of oriental fruit fly.

J. econ. Ent., 1952, 45: 388-95, bibl. 3.

Preliminary small-plot field tests with some of the new organic insecticides on bananas and guavas in Hawaii have indicated that the oriental fruit fly, *Dacus dorsalis*, may be controlled with certain insecticides. The best materials were wettable powder formulations of parathion applied at rates of 1.7 to 2.2 lb. per acre, CS-708 and DDT at 3.4 to 5.2 lb., and a combination of 50% DDT at 2.25 lb. plus 25% parathion at 0.14 lb. EPN, aldrin, dieldrin and lindane at 0.85 to 2.2 lb. per acre were also promising when applied to bananas at 2-week and to guavas at 3-week intervals. Parasitization of the oriental fruit fly by *Opius* spp., while reduced in some cases, was not eliminated by the treatments. [From authors' summary.] [*Opius* spp. are now established in Hawaii, *Calif. Agric.*, 1952, 6 (7): 13.]

1243. SPOON, W.

Van bananenmeel tot bananenpoeder. (From banana flour to banana powder.)

[English summary $\frac{1}{2}$ p.]

Reprinted from *Voeding*, 1952, 13: 307-13, bibl. 13, illus., as *Ber. Afd. trop. Prod. kon. Inst. Trop.*, Amsterdam 238.

Banana flour, prepared from sun-dried or artificially dried, unripe bananas, contains little or no sugar and has not attracted much interest commercially. Recently, however, a banana powder has been prepared from ripe bananas and this consists mainly of sugars. The composition of 5 samples of banana powder from the United States, Brazil and French Guinea is tabulated. It is shown to be a valuable foodstuff.

Cacao.

1244. F.A.O.

Cocoa situation report No. 3.*Commodity Rep. F.A.O.*, July 1952, pp. 47, 25 c.

Details are given of world production of cocoa beans, of demand and of international trade and prices. Principally owing to bad weather conditions the 1951/52 crop was only 676,000 tons compared with 775,000 in 1950/51. 1951/52 prices were higher, reaching 38-42 U.S. cents per lb. No major increase in output is expected in the next 5 years. Since the war, demand has expanded in North America and recovered in Europe and the strong demand has caused a great rise in prices. The pattern of world trade in 1951 was little different from that in 1950.

1245. BROOKS, E. R., AND GUARD, A. T.

Vegetative anatomy of *Theobroma cacao*.*Bot. Gaz.*, 1952, 113: 444-54, bibl. 4, illus.

In this study of the morphology and anatomy of cacao, detailed observations are made on root, stem and leaf anatomy, chupon and orqueta formation, the basal and apical pulvini in petioles, and the flowering cushion. It is shown that chupon and fan woods are anatomically similar. There is a lack of internodal elongation between the nodes of the 5 branches of the orqueta. There is only 1 bud to a leaf axil and a flowering cushion is derived from a solitary axillary bud. The upper and lower epidermis of the leaves are strikingly different, stomata occurring only in the lower epidermis; the guard cells are very small.—Purdue Univ., W. Lafayette, Indiana.

1246.* EVANS, H.

Physiological aspects of the propagation of cacao from cuttings.*[Mim. Pap.] 13th int. hort. Congr.*, London, 1952, pp. 10.

1. The most important physiological factors involved in the rooting of cacao cuttings are evaluated. 2. The leaf is shown to be important only in so far as its photosynthetic activities are concerned: this function may be replaced on an experimental scale by introduction of sucrose into the cutting. 3. The most important external factors involved in rooting are light intensity, temperature, air humidity and air-moisture relations of the rooting medium. Light alone is only important in so far as its effect on photosynthesis is concerned. Temperature is important in view of its interactions with light intensity and its effect on the photosynthetic-respiratory compensation point and on relative humidity. The air moisture relation of the rooting medium is critical in that rapid rooting only occurs when this factor is within relatively narrow limits. 4. Amongst the internal factors, age of tree, stage of development of the shoots and the nutrition of the leaves are important—the latter is the chief cause of differences in the rooting ability of different clones. 5. In difficult rooting *Theobroma* species, grafting experiments indicate that the cause of slow rooting cannot be ascribed to the leaves or to substances emanating from the leaves but must rather be sought in the physiological features of the tissues, particularly the cambial tissues, of the stem at the site where root primordia are normally differentiated. [Author's summary.]

* See note, p. 3.

1247. VALLAEYS, G.

Le bouturage du cacaoyer. (The propagation of cacao from cuttings.)*Bull. Inf. I.N.E.A.C.*, 1952, 1: 103-22, bibl. 18, illus.

The technique adopted at Yangambi for rooting cacao cuttings is described in detail. The propagators are of the I.C.T.A. type, with sand as the medium. As no clear difference has been found between the rooting and root systems of chupon and fan cuttings, and single leaf chupon cuttings root slowly, fan cuttings about 20 cm. long are generally used to ensure an adequate supply of material. The cuttings are treated with 3-indolebutyric acid. Shade and humidity are regulated to keep temperatures within the frames below 30° C. The cuttings are removed after 28 days and those that have rooted planted into basket pots and hardened by stages. Unrooted cuttings are put back in the propagators for a week. Despite the use of heterogeneous material the percentage of hardened plants produced has averaged 74.5.

1248. ROSENQUIST, E. A.

Notes on the budding of cacao.*Malay. agric. J.*, 1952, 35: 78-84, bibl. 3, illus.

For the rapid multiplication of Amelonado cacao in Malaya budding has proved more satisfactory than propagation by single-leaf cuttings. Under good conditions about 90% unions and 80% final success can be obtained. The method involves making 2 vertical incisions 1 in. long and $\frac{1}{2}$ in. apart in the stock 6 in. above the ground; the two vertical incisions are connected by a horizontal cut at the top and a tongue of bark peeled downwards. A budpatch is cut to fit and the tongue of stock bark trimmed so as not to cover the scion bud. The budpatch is bound with raffia or tape which is removed 18 days later. A week later the stocks are cut back to within $\frac{1}{2}$ in. of the bud or bent over to force the bud into growth. Stocks have been successfully budded in baskets and in the field, but the latter procedure would appear to be preferable. Results also suggest that Trinitario stocks are slightly easier to bud than Criollo. Budding on watershoots growing from felled Trinitario trees has also been successful. The results described refer to chupon buds, but limited trials with fan buds have given comparable results.

1249. GREENWOOD, M., AND DJOKOTO, R. K.

Symptoms of mineral deficiency in cacao.*J. hort. Sci.*, 1952, 27: 223-36, bibl. 14, illus.

Leaf symptoms developed by cacao seedlings grown in water-cultures containing limiting amounts of iron, manganese, iron-manganese, boron, magnesium, calcium, zinc, zinc-iron and zinc-manganese are described. The symptoms appearing in all combinations lacking zinc are identical with those of "sickle-leaf" disease of West Africa. The most acute symptoms are shown by plants lacking both zinc and iron, in which growth is noticeably greater than in plants lacking only iron. The dentation observed in the leaves of plants growing in calcareous soil has been reproduced in highly exaggerated form in solutions lacking both iron and manganese and in complete nutrient maintained between pH 6.2 and pH 6.5. An increase in the K/Ca ratio produces heavier stems in plants grown in complete nutrient: it delays the appearance of acute chlorosis in plants

lacking iron; it retards growth and accelerates leaf-shedding in plants lacking manganese. [Authors' summary.]—W. Afr. Cacao Res. Inst., Tafo.

1250.* POSNETTE, A. F.

Virus diseases of cacao in West Africa: the present position.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 10, bibl. 11.

The history of swollen shoot disease of cacao in the Gold Coast is much longer than is generally supposed. The virus probably began to spread from indigenous trees to cacao soon after extensive plantings had become established. Small scattered foci of infection appear sporadically, and these enlarge and merge, forming large areas of dead and dying cacao. Three separate campaigns to control the disease have failed for different reasons, although successful control has been achieved on a local scale. Many virus strains occur, causing variation in symptoms. The most virulent strain has spread most rapidly and caused most damage. The viruses are spread by several species of mealybug (Pseudococcidae) which are tended and dispersed by ants, as well as by wind and by walking; they do not fly. Mealy bugs require several hours feeding on an infected plant before they are infective, but can then infect a healthy plant in less than 1 hour. There are ten indigenous species of forest trees known to be susceptible, of which *Cola chlamydantha* and *Ceiba pentandra* are probably the most important; spread within the crop is at present far more prevalent than spread from these wild hosts into the crop. Possible control measures, including the use of systemic insecticides, protective inoculation and resistant varieties, are discussed in the light of the present conditions of cacao cultivation in West Africa. [Author's summary.]

1251. STRICKLAND, A. H.

The dispersal of Pseudococcidae (Hemiptera-Homoptera) by air currents in the Gold Coast.

Proc. roy. ent. Soc. Lond. (A), 1950, 25 (1/3): 1-9, bibl. 5, from abstr. in *Rev. appl. Ent.*, 1952, 40: 185.

Crawlers of *Pseudococcus* spp. and related mealy bugs, the most efficient vectors of the swollen shoot disease of cacao on the Gold Coast, are believed to be dispersed by air. In an investigation to test this, white stove-pipe-type traps were prepared and placed in various situations, where they were not overhung with trees, and at different altitudes, on cacao farms. The total numbers of insects caught were lower in cacao clearings than on hill tops. Coccids, almost all of which were *Pseudococcus* spp., were not numerous, but were more abundant in the clearings than on the hill tops. There was no correlation between the total numbers of insects trapped and rainfall, but coccids considered separately were significantly more numerous in dry weather than during rainy periods; they were commoner at a height of 2 ft. than at 10 ft.

1252. HOLLIDAY, P.

Witches' broom disease of cacao (*Marasmius pernicius* Stahel.).

Colonial 286, 1952, pp. 8, illus., H.M. Stationery Office, 9d.

This pamphlet has been prepared primarily to assist in the recognition and control of witches' broom, should the disease appear in territories at present free from it. Its symptoms, the life history and dissemination of the fungus, and the control measures adopted in Trinidad are described.

1253. CASTAÑO A., J. J.

Moniliasis del cacao en una región del departamento de Caldas. (*Monilia pod rot* of cacao in Caldas, Colombia.)

Bol. inf. Colombia, 1952, No. 29, pp. 37-40.

A description is given of the symptoms, causative fungus, predisposing factors, method of infection and of laboratory studies on the fungus. Control measures recommended are: (1) the careful removal and burial at a distance from the plantation of infected pods; (2) the slight reduction of shade to allow in more light and air; and (3) the regular cleaning and removal of moss from the tree trunks.

1254. ALIBERT, H.

Les insectes vivant sur les cacaoyers en Afrique occidentale. (The insects living on cacao in West Africa.)

Mém. Inst. franç. Afr. noire, 1951, 15: 1-174, bibl., from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 114.

A survey of the cacao pests of French West Africa with a systematic index of orders, families and species.

1255. MONTSERIN, B. G.

Processing of cacao for the market.

Bull. Dep. Agric. Trinidad 3, 1952, pp. 17, bibl. 3, illus.

Bulk fermentation in sweat boxes and controlled drying are recommended as the best means of processing Trinidad cacao. Peasant proprietors are advised to have their cacao processed in a co-operative fermentary. Constructional details and scale drawings are given of a sweat box, a fermenting house, and a drying floor with a sliding roof.

1256. NEIRINCKX, G., AND JENNEN, A.

Étude de la qualité du cacao. Comparaison de différentes méthodes de fermentation et de séchage. (A study of quality in cocoa. A comparison between different methods of fermentation and drying.)

Bull. agric. Congo belge, 1952, 43: 273-382, bibl. numerous, illus.

Samples of cacao beans that had been turned twice a day, once a day, once every 2 days or once every 3 days during fermentation and were subsequently dehydrated or sun dried were subjected to detailed physico-chemical analyses and quality tests, and to an examination of their tannins. From the results obtained it is concluded that, contrary to the general view, tannins should not be completely eliminated, because certain of them are essential to the production of the aroma characteristic of well fermented cocoa. It is the tannins that are soluble in water that have an undesirable effect on flavour. Methods of extracting tannins are compared in relation to quality. Sun drying produced a better sample than dehydration. This indicates that fermentation should not be looked on solely as a process favouring oxidation, but also as a means of conserving diastases

* See note, p. 3.

which subsequently complete the changes within the bean under the relatively cool and humid conditions of sun drying. Good quality cocoa can, however, be obtained in driers if the drying temperature is reduced to about 50° C., the atmosphere inside the drier is kept humid at all times, and contact between the beans and materials which may taint them is avoided. Specially designed rotating drums should be tested as a means of providing optimum conditions. Control of the fermentation process should be provided by chemical tests and it is therefore essential that the persons in charge should be skilled and possess the necessary laboratory equipment.—Lab. Rech. chim. Minist. Colon., Teruren.

1257. FORSYTH, W. G. C.

Cacao polyphenolic substances. I. Fractionation of the fresh bean.

Biochem. J., 1952, **51**: 511-16, bibl. 30.

1. The polyphenolic components in extracts of fresh cacao beans have been examined by paper strip chromatography. 2. At least eleven polyphenols are present and have been separated on columns of cellulose pulp. 3. In Forastero (purple) beans there are two main anthocyanins with also a trace of a third pigment, with the properties of a cyanidin diglycoside. The two main pigments are a cyanidin monoglycoside and a cyanidin pentose glycoside, the sugar radicals being respectively glucose and glucose-arabinose. 4. A sugar-free leucocyanidin and a mixture of leucocyanidin glycosides are also present. 5. There are at least six catechin-like substances of which epicatechin is the main component. From chromatographic comparison, catechin, epigallocatechin and gallocatechin would appear to be present. 6. The chemical similarity between different species and varieties of beans used in chocolate manufacture is striking. [Author's summary.]

1258. FORSYTH, W. G. C.

Cacao polyphenolic substances. 2. Changes during fermentation.

Biochem. J., 1952, **51**: 516-20, bibl. 8.

1. The changes in the polyphenolic constituents of cacao cotyledons during commercial fermentation have been estimated by quantitative paper chromatography. 2. The main change is the conversion of the simple cyanidin compounds to more complex leucocyanidins. 3. Although oxidases are present they do not act in the cotyledons during fermentation due to the anaerobic conditions prevailing. 4. The catechin is partly lost by exudation and is then to some extent oxidized under the more aerobic conditions prevailing in the testa. Oxidation in the cotyledons, however, only takes place during the drying period. 5. It is possible to obtain conversion of the cyanidin compounds with sun-dried, unfermented, powdered beans, in buffers under anaerobic conditions. The reaction appears to consist of several stages. [Author's summary.]

1259. SMITH, K. G.

The spraying of bags of cocoa beans with a macrodosage of DDT against *Ephestia* and *Tribolium*.

Bull. ent. Res., 1952, **43**: 313-15, bibl. 1.

Surfaces of bags containing fumigated cacao were sprayed with 956 mg./sq. ft. DDT applied as a 5% suspension of wettable powder in water. The treatment

was effective against *Tribolium castaneum* but not against *Ephestia cautella*.

Cinchona.

(See also 1368c.)

1260. WINTERS, H. F., AND LOUSALOT, A. J.

The effect of light and nitrogen levels on growth and alkaloid content of young plants of *Cinchona ledgeriana*.

Plant Physiol., 1952, **27**: 575-82, bibl. 5, illus.

In 1946 an experiment was started at the Toro Negro cinchona plantation, Puerto Rico, to determine the light and nitrogen requirements of cinchona plants during the nursery stage. Four light conditions were factorially combined with 3 levels of N. Early in the experiments the plants growing under 68% of full sunlight and full sunlight showed some yellowing of the leaves and reddening of the stems. Later these symptoms became less noticeable. Symptoms of nitrogen deficiency developed in the low- and medium-nitrogen plots. On the other hand, plants receiving high nitrogen were thrifty and had a dark foliage colour. Plants grown under 68% of full sunlight and full sunlight were able to utilize nitrogen better than plants grown under 30% or 45% of full sunlight. Statistical analysis of height measurements made at the end of the experiment showed no significant differences between either the light or nitrogen treatments. Differences between light treatments, as measured by dry weight of the plants, were significant only between the low-light level and the three higher levels with no significance in dry weight between the three higher light intensities. Plants grown with high nitrogen supply were significantly larger than those with low or medium nitrogen supplies with no significant difference between the low- and medium-nitrogen treatments. There was no statistically significant interaction between light and nitrogen on either height or dry weight. The total alkaloid and quinine content of the roots increased as both light and nitrogen levels increased. The percentage of these constituents was highest when both light and nitrogen levels were high but light appeared to be the more important factor in the formation of cinchona alkaloids. There was no consistent or marked effect of the treatments on the quinine and total alkaloid content of the stems. [From authors' summary.]—Fed. Exp. Stat., Mayaguez, P.R.

Coconuts.

(See also 1368v.)

1261. CASSIDY, N. G.

The potash status of coconuts on Viti Levu.

Agric. J. Dep. Agric. Fiji, 1952, **23**: 25-6.

The coconut water in 40 nuts from 15 palms, some of which were normal and the others yellow and stunted, was analysed for K₂O. Only in 2 cases was the K₂O content below 2 g./l., and the yellowing does not therefore appear to be due to K deficiency.

1262. HENDERSON, J. H. M., DURRELL, M. E., AND BONNER, J.

The culture of normal sunflower stem callus.

Amer. J. Bot., 1952, **39**: 467-73, bibl. 22, illus.

A technique for the production and subsequent culture *in vitro* of normal sunflower stems callus tissue has been described. This technique includes the use of a medium containing a supplement mixture of auxin (IAA), adenine, vitamins, and casein hydrolysate. This medium was found to support successfully the continued growth of the callus tissue. The addition of coconut milk to the nutrient medium greatly accelerates the growth of normal sunflower callus. Coconut milk and the supplement mixture together give significantly greater growth than any other combination of ingredients which have been tried. These results confirm past reports that coconut milk contains an important growth-promoting principle, a material different from other recognized plant growth factors. [Authors' summary.]—Calif. Inst. Technol., Pasadena.

1263. MARTYN, E. B.

Diseases of coconuts in Trinidad and Tobago.

J. agric. Soc. Trin. Tob., 1952, 52: 145-9.

Of the 3 chief diseases of coconuts in the Caribbean/South American region—red ring, bronze leaf wilt and unknown disease—only the first 2 are found in Trinidad. Minor diseases are bud rot (fungal) and little leaf and tapering stem or pencil point (both due to old age or nutritional deficiencies).

1264. POOTJES, J. R.

Handleiding voor het veldonderzoek en de bestrijding van de Artona-plaag. (Directions for the field study and control of the coconut caterpillar, *Artona catoxantha*.) *Landbouw*, 1951, 23: 563-86, illus.

An account is given of the occurrence, economic importance, morphology and biology, and parasites of the coconut caterpillar, *Artona catoxantha*, in Indonesia, followed by details of the methods used for its control. These include regular, organized inspection of the plantations, removal and burning of leaves where the attack is slight, and spraying with a derris/talc suspension where it is severe.

1265. SALGADO, M. L. M.

Note on the breeding of red weevil in crowns of palms recently felled.

Ceylon Coconut Quart., 1952, 3: 107.

The red weevil, *Rhynchophorus ferrugineus*, the most important coconut pest in Ceylon, normally breeds on living palms. Recently its grubs have been observed in large numbers in the decaying crowns of felled palms in two areas. The cutting up and burning of crowns is indicated.

Coffee.

(See also 278, 1229, 1337, 1364, 1368a, e, s, x, z.)

1266. McMASTER, P. G., AND SOLLY, N. R.

Coffee and its economics in Kenya.

Coffee Board of Kenya, Nairobi, 1952, 8½ × 5½ in., pp. 58, illus., 5s. 6d. post free, reprinted in *Mon. Bull. Coffee Bd Kenya*, 1952, 17: 10-12, 33-5, 56-7, 81-4, 154-6, 185, 206-9, 232-3.

This booklet refers to the coffee areas east of the Rift Valley and for convenience divides them into 2 zones, the lower altitudes (4,800-5,200 ft.) for which K2 is the best variety, and the medium and higher (5,200-6,000 ft.) for which S.L.28 is the best. Arabica coffee requires a

soil at least 6 feet deep and with a good humus content. Subjects covered are: shading and shade trees; cultural points (green manure or a good weed crop at lower altitudes, cutting and hoeing of weeds with forking every few years at medium and higher altitudes, methods of mechanical cultivation); soil conservation (anti-erosion measures such as "eyebrow" pits on steeper slopes and contour ridging on gentler slopes, mulching with swamp or Napier grass of alternate lines in alternate years with manuring and cover cropping in the unmulched lines); manuring; pruning (multiple stem for lower and higher altitudes and either single or multiple for medium altitudes); diseases and their control (*Hemileia vastatrix*, *Pseudococcus kenyae*, *Antestia*, *Lygus*, green scale, *Asterolecanium* scale, *Leucoptera coffeella*); harvesting; estate factory preparation; economics; labour.

1267. BARTOLOME, R.

Coffee production in the Philippines.

Philipp. J. Agric., 1950 (issued 1952), 15: 219-33, bibl. 32, illus.

This paper, which is designed to encourage the expansion of the industry in the Philippines, briefly covers the following points: economic species, soil and climatic requirements, raising seedlings, shade trees, transplanting, maintenance, pest and disease control, harvesting, and preparation of berries for market.

1268.* KRUG, C. A., AND CARVALHO, A.

Coffee breeding.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 13, bibl. 74.

There is an urgent need for breeding new strains of coffee. Selection is in progress in São Paulo and Paraná in Brazil. The two commonest species, *Coffea arabica* and *C. canephora*, both offer sufficient genetic variability for success in breeding. Methods successfully adopted with *C. arabica* at the Instituto Agronomico, Campinas, São Paulo, have been based on individual plant selection, progeny trials and both inter-varietal and inter-specific hybridization. Elsewhere, where *Hemileia* leaf rust is a problem, breeding is being carried out on *C. canephora*. Pleas are made for making more material available to breeders and for more work on the production of *Hemileia*-resistant varieties.

1269. RAMÍREZ BERMÚDEZ, J.

Especies y variedades de café. (Species and varieties of coffee.)

Rev. agric. Guatemala, 1950 (issued 1952), 1 (5/6/7): 9-17, illus.

A classification is given of the genus *Coffea* with descriptions of the principal species in the section *Eucoffea* and of the 3 most important arabica varieties, Typica, Bourbon and Maragogipe.

1270. ANON.

Café Sumatra de Mundo Novo. (The coffee variety Mundo Novo.)

Promissores os resultados das experiências do Instituto Agrônomo com o café "Mundo Novo". (Promising results with the coffee variety Mundo Novo at the Institute of Agronomy [São Paulo].)

Bol. Super. Serv. Café, S. Paulo, 1952, 27: 337-41, 344-6.

* See note, p. 3.

An account is given of the history and qualities of the coffee variety *Mundo Novo*, discovered in Brazil in 1943. It is thought to be a natural hybrid of the varieties Bourbon and Sumatra, and is outstanding for its vigour and hardiness. Many of the plants are also very productive but the population is heterogeneous and selection is necessary. Good selections are being distributed in small quantities to growers.

1271. VALLAeYS, G.

La bouturage du caféier Robusta. (The propagation of robusta coffee by cuttings.) *Bull. Inf. I.N.E.A.C.*, 1952, 1: 205-28, bibl. 30, illus.

The results are given of a series of trials at Yangambi with robusta coffee cuttings set in ICTA propagators similar to those used for cacao but with less dense overhead shade. In the first trials terminal cuttings set in fine river sand rooted better than cuttings set in a mixture of sand, soil and coffee berry compost, but in both cases over 60% of the cuttings rotted. When the sand medium was sterilized with chloropicrin and the cuttings soaked for 15 mins. in a 5% solution of Fermate, rotting was reduced to 25% to 40% within the first 4 weeks and all the remaining cuttings survived and rooted within 11 to 12 weeks. Orthotropic shoots cut into a series of non-terminal, 1-node (2-leaf) cuttings with lateral shoots cut back close to the stem started rooting in 4 weeks and showed 80% or more rooting in 8 weeks; a rot, however, was apt to develop in the stubs of the lateral shoots and attempts to prevent this by treating the stub with wound dressings were unsuccessful. In 2 trials on the frequency of watering, applying water on alternate days gave better results than watering daily, but did not prevent a high percentage of rotting in unsterilized cuttings; the addition once a week or once a fortnight of 0.25% Certosan to the water damaged the cuttings without checking rotting. The treatment of cuttings with 0.25% indolebutyric acid did not increase the yield of rooted plants and treatment with 0.5% caused a considerable reduction in percentage strike; both concentrations, however, markedly increased the number and length of roots formed. Large scale propagation is now in progress.

1272. LEUPEN, F. F.

Toepassing van het "blijver-wijker"-systeem bij koffie. (Application of the "filler" planting system to coffee.) [English summary 1/2 p.] *Bergcultures*, 1952, 21: 99-105, bibl. 1.

The possibility is examined of combining the advantages of high early yields, obtained from close planting, with the high mature yields which require wide spacing after the first few years. This could be obtained in practice by the "filler" system such as is used in apple orchards, the filler trees being grubbed after the first few years of bearing. The results of a spacing experiment carried out in Indonesia from 1932 to 1940 [see *H.A.*, 11: 927] are discussed, and the design of a new experiment, based on the earlier results, is described.

1273. PEREIRA, H. C.

Coffee trials. *A.R. Kenya Dep. Agric. for 1950*, Vol. II, 1952, pp. 138-43.

Cultural trial. In a 4-year trial of implements (forked

by hand, tractor disc, tractor plough) and weed control policies (clean-weeded, slashed during rains, tall weeds) clean weeding continued to give highly significant yield increases while soil pore space and permeability showed a decline. *Soil structure measurements of cultural effects*. In a trial with similar factors the progressive decline of soil structure under continuous cultivation is well illustrated by the percolation rates which are lowest for clean weeding (9.8 in. per hour) followed by slashed weeds (10.3) and tall weeds (15.6). *Manurial trial I*. On red volcanic soils coffee does not respond to phosphates or cattle manure but is sensitive to N supplies. *Mulching and soil regeneration trial*. In a study on poor coffee on a badly eroded slope nil and 32 tons/acre cattle manure were applied and mulching treatments were all rows and alternate rows before rains and all rows after rains. The increase due to alternate row mulching before the rains was significant and the further increase due to all rows mulching before the rains was also significant, the latter exactly doubling the crop. There was a small non-significant response to cattle manure and none to post-rains all rows mulching.

1274. SETZER, J.

Sôbre a ecologia do café. (The ecology of coffee.) *Bol. Super. Serv. Café, S. Paulo*, 1952, 27: 313-22.

A detailed survey is made of the climatic conditions (temperature, rainfall, light and drought) and the soil conditions (organic matter, pH, available chemical nutrients, microbial activity, colloidal structure, granular structure, permeability and depth) required by the coffee tree. Special reference is made to conditions existing in Brazil.

1275. SUAREZ DE CASTRO, F.

Pérdidas por erosión de elementos nutritivos, bajo diferentes cubiertas vegetales. (Losses of nutrient elements by erosion under different soil covers.) *Agríc. trop. Bogotá*, 1952, 8 (8): 31-6, bibl. 8.

As a result of experiments carried out over 2 years at the National Centre for Coffee Investigations, Colombia, on bare land, pasture land, young coffee plantations and old coffee plantations, the erosion losses of nitrates, other forms of N, P, K, Ca and Mg are tabulated. There was a close correlation between the loss of nutrients and the amount of rain falling each year, but not between the former and the intensity of rainfall. In both years the loss of nutrients was highest from the bare land and lowest from the old plantations, except in the case of nitrates and P where the loss was lowest from the young plantations. The amount of Ca lost from bare land was 100 times higher, and that of Mg 70 times higher than from old plantations.

1276. SUAREZ DE CASTRO, F.

Las acequias de ladera en el control de la erosión. (Lateral drainage channels in the control of erosion.) *Agríc. trop. Bogotá*, 1952, 8 (7): 9-15, illus.

An account is given of the calculation and construction of lateral drainage channels for erosion control on sloping land, with special reference to their use in coffee plantations.

1277. ANON.
Adubos verdes. (Green manure crops [for coffee].)
Bol. Super. Serv. Café, S. Paulo, 1952, 27: 442-5.
Advice is given from the Institute of Agronomy, Campinas, on the use of green manure crops to supplement farmyard manure in coffee plantations. The most widely grown crops are *Canavalia ensiformis* and *Crotalaria juncea*. Methods of seed production and cultural practices for these two species are described.
1278. DE OLIVEIRA, E. A., JR.
Lavouras intensivas em terras restauradas apresentam altos rendimentos na região de Campinas. (Intensive management [of coffee plantations] on restored soil gives high yields in Campinas.)
Diário de S. Paulo, 4 May, 1952, reprinted in Bol. Super. Serv. Café, S. Paulo, 1952, 27: 521-4.
A discussion of the way in which mixed farming, such as a combination of coffee, citrus, eucalyptus, cattle or poultry, can be used in the "old" coffee zones of Campinas, Brazil, to improve soil fertility and profits.
1279. ANON.
Reerguimento das fazendas de café em zona "velha". (Restoration of coffee plantations in the "old" zone.)
Rev. Soc. rural brasil., reprinted in Bol. Super. Serv. Café, S. Paulo, 1952, 27: 231-3.
Details are given of the method by which an old coffee plantation on exhausted soil in Brazil was restored to full productivity, the yield being increased from an annual average of 40 arrobas [600 kg.] per 1,000 trees in 1936-39 to 97 arrobas [1,455 kg.] in 1948-50. Livestock were introduced to provide manure, contour ditches were dug to prevent erosion, unproductive trees were replaced by high yielding ones, systematic organic and chemical manuring was practised and protective sprays were given.
1280. CORRÊA NETO, P.
O sombreamento dos cafézais, no estado de S. Paulo. (Shading coffee in the State of São Paulo.)
Bol. Super. Serv. Café, S. Paulo, 1952, 27: 592-6.
Numerous examples are given of cases in which the establishment of an *Inga* shade in poorly yielding coffee plantations in São Paulo, Brazil, has restored productivity and reduced the losses from coffee berry borer.
1281. LAZZARINI, W.
Ensaio preliminar de irrigação de café. (Preliminary trials in coffee irrigation.)
Bol. Super. Serv. Café, S. Paulo, 1952, 27: 408-16.
Trials were carried out over the period 1944 to 1950 at the Ribeirão Preto Experimental Station, Brazil, on the irrigation of coffee plantations. Furrow irrigation was used at irregular intervals from May to September. Over the 7 years the average increase in yield obtained by irrigation was 119%; it was never less than 50% and in 1950, the only year in which fertilizers were given, it was as much as 173%. The amount of processed coffee prepared from fresh samples was also increased by 17%.
- Observations made in one year indicated that irrigation hastened ripening. A warning is given that irrigation would only be economic in plantations that were in a healthy condition.
1282. URHAN, O.
Contribución al estudio de la Crespiera. (Contribution to the study of the "crespiera" disease of the coffee bush.)
Bol. inf. Colombia, 1952, No. 31, pp. 17-24, illus.
The "crespiera" disease, whose occurrence in Colombia is practically limited to the Antioquia province, is believed, in the light of experiments, to be due to mineral deficiency, probably of major elements. Its symptoms are: marked reduction in the length of internodes and increase in the number of nodes, increased development of multiple buds, reduction in size (especially width) of leaves and number and size of flowers which are often greenish-yellow and deformed, abnormal pollen grains with reduced fertility, a high percentage of single-seeded fruits and much reduced yield.
1283. MOREAU, M., AND MOREAU, C.
Le dépérissement du caféier en Côte d'Ivoire. (The decline of coffee in the Ivory Coast.)
Rev. Mycol., 1951, 16 (Suppl. Colon.): 12-80, from abstr. in Rev. int. Bot. appl., 1952, 32: 290-1.
A recent mycological investigation on a decline which is threatening coffee plantations in the Ivory Coast brought to light the presence of the following chief fungal diseases: *Auerswaldia excoriata* and *Peroneutypa multistromata*—causing tylosis; *Gibberella xylarioides*, cause of tracheomycosis which is at present devastating the Ubangi excelsa and robusta plantations; *Nectria coffeigena* and *Hypomyces haematococcus*—agents of canker; *Hypomyces haematococcus* var. *breviconus*—collar rot; *Macrophomina phaseoli* in its form *Sclerotium bataticola*—agent of serious anatomical changes in the conducting tissue; a pycnospore form apparently associated with *Trybliidiella rufula*. Thirteen other fungi were found to weaken plants without obstructing the vessels.
1284. FRASELLE, J. V., AND GEORTAY, G.
Une grave maladie du caféier "Robusta": la trachéomycose. Avertissement et conseils aux planteurs. (Tracheomycosis, a serious disease of robusta coffee. Warnings and advice to planters.)
Bull. Inf. I.N.E.A.C., 1952, 1: 87-102, bibl. 8, illus.
Although the presence of this disease, caused by *Fusarium xylarioides*, was reported in 1939, it only assumed epidemic proportions in certain areas of the Belgian Congo in 1949. The symptoms of the disease, the fungus and its mode and rate of spread, and preventive and control measures are described.
1285. GONZÁLEZ MENDOZA, R.
Especialización de los nematodos de la raíces de cafeto, guamo (inga) y platano. (Specialization in the root nematodes of coffee, inga, and banana.)
Bol. inf. Colombia, 1952, No. 29, pp. 34-7.

In investigations at the National Coffee Research Centre, Chinchina, Colombia, into the degree of specialization of the root nematodes of coffee and of 2 of the plants commonly used as shade in coffee plantations (banana and inga), plants of these 3 species were planted together in 3 large boxes, in each of which the soil had previously been infected with a different one of the 3 nematodes in question. A study of the roots after 6 months showed that: (1) the coffee root nematode is highly specialized and has little liking for inga or banana; (2) the inga root nematode displays little specialization, a marked predilection for coffee to whose roots the entire population removed in some cases, and little liking for banana; (3) the banana root nematode displays little specialization, a marked predilection for coffee and no liking for inga; (4) all 3 species displayed a marked predilection for coffee roots. Since coffee alone is seriously affected, control in replanting might be limited to disinfection of the holes to be occupied by coffee bushes and the adjacent soil.

1286. SEIXAS, C. A.

O "bicho mineiro" das fôlhas do cafeeiro e seu combate pelos polvilhamentos e adubações. (The coffee leaf miner and its control by dusts and manuring.)

Bol. Super. Serv. Café, S. Paulo, 1952, 27: 325-8.

Notes on the incidence and life history of the coffee leaf miner (*Perileucoptera coffeella*) in Brazil are followed by instructions for its control. Dusting with BHC (1% gamma isomer) at 40 kg. per 1,000 trees is recommended, 2 applications being made 20-25 days apart during the dry season. Good results have also been obtained with 4 applications, from May to August, at the rate of 20 kg. per 1,000 trees. Adequate organic manuring increases the resistance of the trees to attack. The insects often pupate on the leaves, so all fallen leaves should be collected and buried.

1287. CAMACHO CORRALES, C. A.

Apuntes sobre el combate de *Saissetia hemisphaerica* y *Aphis* sp. (Huevillo de los cafetos). (The control of *Saissetia hemisphaerica* and *Aphis* sp. on coffee.)

Suelo Tico, 1951, 5: 263-5.

The scale *Saissetia hemisphaerica* usually attacks coffee trees in association with aphids and black ants. In trials in Costa Rica good control of all 3 pests was obtained by the use of 4% citro-mulsion with the addition of 40-50% chlordane at the rate of 2 oz. per 3 gal.

1288. BARTON, L. V., AND GOENAGA, A.

An electrical moisture meter for the determination of moisture in coffee beans.

Contr. Boyce Thompson Inst., 1952, 16: 461-8, bibl. 4.

The determination of the moisture content of coffee in "coco", when that moisture is within the range of 10-23% of the dry weight of the coffee, may be made on the Universal Moisture Tester using measured lots (standard volumetric cup for large grains) compressed to 0.500 inch, and applying a small correction (-1.75%). This recommendation can be made even though coffee in "coco" is made up of a heterogeneous mixture of whole fruits, broken fruits, clean seeds and fruit coats. [Authors' conclusions.]

1289. TOSELLO, A.

Dados para a construção de lavadores de café da roça. (Data for the construction of a washing apparatus for coffee.)

Bol. Super. Serv. Café, S. Paulo, 1952, 27: 494-9, bibl. 1, illus.

Detailed directions and diagrams are given to enable the grower to construct his own coffee washing and separating equipment.

1290. ANON.

Ein Schädlingsbekämpfungsmittel aus Kaffee. (An insecticide from coffee.)

Gordian Kaffee- u. Teemarkt, 1951, 1 (24): 13-14.

A new insecticide "Cofco", obtained from coffee pulp, has been developed in San Salvador and is proving particularly valuable against mosquitoes.

1291. NATARAJAN, C. P., BHATTIA, D. S., AND SUBRAHMANYAN, V.

Studies on the utilization of coffee husk.

J. sci. industr. Res., India, 1952, 11A: 410-11, bibl. 3.

Tests have shown that roasted coffee husks in proportions up to 30% can be blended with coffee in place of chicory. Arabica husks were better for the purpose than robusta husks. The compositions of the husk and parchment are tabulated.

Guavas.

(See also 1242.)

1292. PUTTARUDRAIAH, M.

Blister disease "Kajji" of guava fruits (*Psidium guajava*).

Mysore agric. J., 1952, 28: 8-13, bibl. 12, illus.

The widespread blister or scab disease of guava fruits is caused by the capsid bug, *Helopeltis antonii*. The insect and its life history are described. BHC, as Gammexane D 025 dust mixed 1:1 with wood ash, and DDT have given good control.

1293. ARTHUR, H. R., AND HUI, W. H.

Triterpenes from *Psidium guajava*, L.

Chem. Ind. Lond., 1952, p. 693.

A triterpenoid compound has been isolated in 1% yield from the leaves and in 0.3% yield from the bark of guavas.

Mangoes.

(See also 1092, 1099, 1101, 1368n, 1369n.)

1294. DIJKMAN, M. J., AND SOULE, M. J., JR.

A tentative method of mango selection.

Proc. Fla. St. hort. Soc. for 1951, pp. 257-62, bibl. 25.

With the expansion of mango growing in Florida the time has arrived when a large-scale systematic breeding and selection programme should be adopted. The literature on the subject is reviewed, the problems to be faced are discussed and compared with those involved in the improvement of hevea, and a tentative programme of selection and testing suggested.

1295. LYNCH, S. J., AND NELSON, R.

Mango budding.

Proc. Fla St. hort. Soc. for 1949, pp. 207-9, illus. [received Nov. 1952].

Additional notes on mango budding.

Proc. Fla St. hort. Soc. for 1950, pp. 266-8, illus. [received Nov. 1952].

A method of chip budding is described in which shield buds from depetioled shoots are inserted like side grafts into stocks that only germinated 1-3 weeks earlier and are still in the red succulent stage. The buds are wrapped in a gas-permeable 20 gauge vinylite film. The scion tips from each bud stick can be similarly side grafted into these succulent stocks. The best method of forcing the buds to grow is to cut off the stock in one operation 7-10 days after budding.

1296. SMITH, P. F., AND SCUDDER, G. K., JR.

Some studies of mineral deficiency symptoms in mango.

Proc. Fla St. hort. Soc. for 1951, pp. 243-8, bibl. 6, illus.

Two trees each of the Haden and the Zill variety of mango were grown for 3 years in sand cultures with solutions from which eleven essential mineral elements were systematically omitted in an attempt to define as many leaf deficiency symptoms as possible. Deficiency symptoms in leaves were found for six elements as follows: N, small leaves and general yellowing; P, a leaf-tip necrosis, premature abscission and stem dieback; K, irregularly distributed yellow spots and necrotic areas along the margins of small, thin, attenuated leaves which are very persistent; Mg, a green-wedge pattern formed by the lateral intrusion of a bronzed chlorosis along the leaf margin; Mn, yellowish-green chlorosis over the small veinal network; and S, lateral necrotic spots on a very deep green leaf and premature defoliation. No specific symptoms were found when Ca, Cu, B, Zn, and Fe were omitted, but omission of the first three resulted in considerable growth reduction. Trees fed only calcium nitrate showed deficiency leaf patterns for P, Mg, and K in succession. Trees that were supplied with all of the nitrogen as ammonia showed a marginal scorch of young leaves and died within a few months. [Authors' summary.]

1297. MUSTARD, M. J., AND STAHL, A. L.

Packaging and storage of mangos and avocados.

Proc. Fla St. hort. Soc. for 1949, pp. 226-32, bibl. 4 [received Nov. 1952].

This report describes the preliminary work which has been completed to date on the storage of mangos and avocados at this institution. A comparison is made of the effect of various packaging and dipping materials, temperature, and filters for the removal of ethylene upon the storage life of these fruits. Although various means have been found to decrease the moisture loss and rate of ripening of mangos and avocados in storage, additional work is needed to determine means for the control of pathological and physiological breakdowns which are prevalent during the storage of these fruits. [Authors' summary.]—Univ. Miami.

1298. RICHARDSON, H. H.

Ethylene dibromide fumigation of mangoes and almendras infested with *Anastrepha* fruit flies.

J. econ. Ent., 1952, 45: 541-3, bibl. 1.

In Puerto Rico complete mortality of the larvae and pupae of the West Indian fruit fly, *Anastrepha mombin-praeoptans*, in mangoes and of *A. suspensa* in almendra nuts was obtained by fumigation with 2 to 6 oz. of ethylene dibromide per 1,000 cu. ft. for 2 hrs at 85-87° F. Little detrimental effect on flavour of several mango varieties could be detected at these rates.

Oil palms.

(See also 1406.)

1299. I.R.H.O.

Diagnostic foliaire. (Foliar diagnosis [of oil palms].)

A.R. Inst. Rech. Huiles Oléag. 1951, 1952, pp. 31-3.

Foliar diagnosis was applied to the oil palm with success in 1951 and made it possible to determine the critical levels of N, P and K and fertilizer formulae. The material used was the central third portion (excluding midrib and margin) of one or more leaflets from the central third portion of full grown leaves showing no signs of old age. The methods of analysis are briefly mentioned. The results so far obtained indicate that the critical levels (above which fertilizer application would probably be uneconomic) for N, P and K are 2.7, 0.15, and 1% respectively. In determining fertilizer formulae, the values of the elements must be based not only on their absolute levels (quantitative) but also on their affinities and antagonisms (qualitative). There is a distinct K/Ca antagonism, a frequent Ca/Mg affinity and very important K/P and K/Mg relationships.

1300. FERRAND, M., OLLAGNIER, M., AND BOYÉ, P.

Résultats des premiers essais de fumure minérale sur les palmiers à huile en Côte d'Ivoire (2^e communication). (Results of preliminary fertilizer trials on oil palms in the Ivory Coast, 2nd report.)

Oléagineux, 1952, 7: 553-6, bibl. 1.

A marked response to K was recorded in the early years of a manual experiment on oil palms started at Dabou in 1946 [see *H.A.*, 20: 2030]. This further report on the experiment shows that the beneficial effect of K has been enhanced with time, and yields of the K plots by 1951 amounted to 1,300 kg./ha. compared with 400 kg. in control plots. The increase in yield has been due mainly to an increase in the number of bunches but latterly there have also been increases of over 25% in the weight of bunches. The K-fertilized trees now carry approximately twice as many leaves, that live twice as long (12 months against 6 months) as the unfertilized trees. There have been similar responses to K, applied as 1 kg. KCl per tree from 1949, in a plantation of 1,400 ha.

Pineapples.

(See also 1368d, 1369d, e.)

1301. EVANS, H. R.

Pineapple propagation.

E. Afr. agric. J., 1952, 17: 179-82, bibl. 1, illus.

Experiments, designed to increase the rate of multiplication, are described in which pineapples were propa-

gated from (a) "discs" cut from mature unfruited stems, (b) fruit tops and suckers split into small vertical sections, and (c) leaves pulled from mature fruit tops. The best results were obtained with method (b) when fruit tops were split in 8 vertical sections; results with smaller sections of 12 or 26 per top were less satisfactory. Maximum shoot production by top sections was reached in 93 days, whereas with discs this stage took 342 days. There was little difference between fruit top sections that were dried before planting or were planted fresh. Three hormones tested on top sections had negligible effects. Suckers split into at most 4 sections were much inferior to the fruit tops split into 8 sections. The leaf cutting method produced a very low percentage of plants.

1302. PY, C.

Nouvelles données sur la fasciation de l'ananas. (New information on fasciation in pineapples.)

Fruits d'Outre Mer, 1952, 7: 342-6, illus.

The author previously suggested nutritional disequilibrium as a cause [see *H.A.*, 19: 3450] but another worker [see *H.A.*, 20: 2035] later stated that fasciation might be due to hereditary characters. Negative results of experiments designed to show that it is hereditary are now reported. Its occurrence after heavy applications of organic manure (but not of mineral fertilizers) led to the hypothesis that it might be caused by some element or hormone resulting from the decomposition of organic matter. A high percentage of fasciation occurred in experiments with 2,4-D used to promote flowering.

1303. PY, C.

La réduction de la couronne d'ananas. (Reducing the crown of pineapples.)

Fruits d'Outre Mer, 1952, 7: 392-8, illus.

A description is given of the methods of crown reduction tested. The gouging method had the disadvantage that it involved a long and difficult operation if it were to be successful. Tests with hormones did not give the results hoped for, but are being continued. The acid method had the advantage of being rapid, efficacious and safe and is employed on a large scale in I.F.A.C. plantations. 1-2 drops of undiluted commercial HCl are placed in the centre of the crown of 8-week-old fruits, and the part that is killed can be twisted off in a fortnight. Total destruction of the crown with acid altered the shape of the fruit, a great advantage in the case of fruit for canning as it increased the yield of slices by 10-20%; this result is being tested in further experiments.—I.F.A.C.

1304. WOLFENBARGER, D. O.

Dipping pineapple planting stock for mealybug control.

Proc. Fla. St. hort. Soc. for 1949, pp. 217-20, bibl. 6 [received Nov. 1952].

Methyl bromide fumigation gave perfect control of the pineapple mealybug on planting stock used for starting new beds. Tests of several different insecticides showed that dips containing 1 lb. of 15% wettable parathion powder gave excellent mealybug control, with safety to the plant. No treatment tried gave perfect control of the pineapple red mite. [Author's summary.]

1305. WOLFENBARGER, D. O.

Control of pineapple mealybug, *Pseudococcus brevipes* (Ckll).

A.R. Fla. agric. Exp. Stats. for 1950/51, p. 257 [received Oct. 1952].

Evidence obtained at the Florida Sub-tropical Station indicated that systox and Compound 4049 are satisfactory for mealybug control. Against pineapple mite, *Dolichotetranychus floridanus*, 0.6 lb. parathion per acre was as effective as any of the other chemicals used.

Rubber trees.

(See also 1368j, p, q, r, 1369h, i, j.)

1306. CEYLON RUBBER RESEARCH INSTITUTE.

Report of the work of the Rubber Research Board in 1951, Colombo, 1952, pp. 82.

The report contains information on: *Clonal trials*: aluminium collar rainguards on budded rubber for increasing crop; stumped buddings *versus* budded stumps and field buddings; stock-scion experiments; clonal seedlings; foreign clones trial; legitimate seedlings; budgrafts; stem-branch budding; crown-budding. *Diseases*: anti-oidium dusting and spraying; oidium control by defoliation with Ca cyanamide; root disease, brown bast. *Manuring*: NPK, N level, fertilizer placement.

1307.* BAPTIST, E. D. C., AND BROOKSON, C. W.

Recent progress in Malaya in the breeding and selection of clones of *Hevea brasiliensis*.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 14, bibl. 16.

The principal characters of the desired type of clone and seedling family are outlined. The preferred methods of breeding, testing and selection are described. A short description is given of the first programme of R.R.I. hand pollinations (series 1-7), and of the R.R.I. "500" series clones. A report is made on the results of the second programme of R.R.I. hand pollinations (series 8-12), and of the R.R.I. "600" series clones. The progress of the third programme of R.R.I. hand pollinations (series 13-17) is briefly described. The improvement resulting from the programmes is described. [From authors' summary.]

1308. RUBBER RESEARCH INSTITUTE OF MALAYA.

Choice of clones and clonal seedlings: planting recommendations for 1952-53.

Circ. Rubb. Res. Inst. Malaya 37, 1952, pp. 6.

These recommendations replace those issued in Botanical Advisory Leaflet B/AL 20 (46) of 1946. They are: for large scale planting—clones Tjirandji 1, Prang Besar 86, R.R.I. 501, R.R.I. 513, Glenshiel 1, Prang Besar Isolated Garden seed from gardens "C", "D" and "E" and Tjirandji 1 seedlings (these last either from monoclonal plantings or from mixed plantings with other good parent clones); for small scale trial—clones R.R.I. 526, R.R.I. 527, L.C.B. 1320, Pr. 107 (L.C.B. 510), clonal seedlings Tj. 1 × R.R.I. 501, Tj. 1 × Avros 157 (Chemara garden "B"), Tj. 1 × Lun. N, Tj. 1 × P.B. 49, Avros 157 × P.B. 49 and Tj. 1 × R.R.I. 509.

1309. CEYLON RUBBER RESEARCH INSTITUTE.

Notes on rubber seedling nurseries.

Adv. Circ. Rubb. Res. Inst. Ceylon 35, 1952, pp. 5, illus.

* See note, p. 3.

This circular supersedes No. 17 (1943) from which it differs only in the sections on manuring and pests and diseases. Recommendations are made for treatment when organic manure is in ample and in short supply and for bringing on backward plants. Control notes have been brought up to date for mites, cockchafer grubs and bird's eye spot and have been added for scale insects. The pre-war figure for cost of opening an acre of nursery land, budwood and upkeep till after budding was 15½ c. per stump; the 1952 figure is 68 c.

1310. EVERS, E.

La présélection des semenceaux en hévéa-culture. (The pre-selection of seedlings in rubber growing.)

Bull. Inf. I.N.E.A.C., 1952, 1: 145-90, bibl. 1, illus.

The pros and cons of establishing a rubber plantation with budded plants, seedlings and seed sown at stake and pre-selected are discussed in detail. The pre-selection method involves planting a large number of seeds in each site to be occupied by a tree, inferior seedlings being eliminated progressively over about 18 months on a basis of initial vigour, general appearance, subsequent growth (girths) and productivity based on testate tapping tests. Preliminary results obtained at Yangambi suggest that the method is not only relatively inexpensive but will result in plantations giving high yields, especially where clonal seed of Tj. 1 is used. Between 15,000 and 24,000 seeds are planted per ha. either in little squares of 49 subsequently reduced to 1 tree, or, where a hedge planting method is adopted, in single or multiple rows with initial spacing of about 20 cm., subsequently thinning to 1 tree every 2 m. at the testate stage and later when tapping starts thinning finally to leave about 500 trees per ha. The operations performed, man-hours used and costs are given in detail.

1311. ANON.

Bovengrondse wortelvorming bij hevea-oculaties. (Aerial root formation by hevea clones.)

Bergcultures, 1952, 21: 325, illus.

A brief note, accompanied by illustrations, on the formation of roots from the bast of hevea trees that had been injured by fire. Roots developed up the stem to a height of 1 m.

1312. LASSCHUIT, J. A., AND VOLLEMA, J. S.

De meeldauwresistente cloon LCB 870. (The mildew resistant clone LCB 870.)

[English summary ½ p.]

Bergcultures, 1952, 21: 257-61, bibl. 4.

The mildew resistant hevea clone LCB 870 is low yielding and is therefore best used by crown budding it onto high yielding seedlings. An experiment was laid out in Java in 1928 to determine whether top budding with this clone would affect the growth and yield of the stem of the rootstock and, if so, to what distance below the union. One hundred seedlings were budded at a height of 2 m. with LCB 870, and others were left unbudded as controls. The LCB 870 crowns had a markedly depressing effect on the yield of the seedling stocks to a distance of at least 100 cm. below the union. At 150 cm. below the union, however, the yield of the stocks was the same as that of the unbudded seedlings at the same

height. The exact distance to which the scion effect extended was not determined, but it is recommended that top budding should be done at a height of 250 cm. in order to obtain an unaffected tapping panel of at least 100 cm. from ground level. These results are published belatedly in view of the renewed interest that is being taken in this clone.

1313. KAIMAL, K. N.

The bark of the mature rubber tree.

Indian Rubb. Bd Bull., 1951, 1 (2): 25-38, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 24.

Anatomical descriptions are given of the bast and latex vessels, with notes on tapping and bast regeneration.

1314. RICHES, J. P., AND GOODING, E. G. B.

Studies in the physiology of latex. I. Latex flow on tapping—theoretical considerations. *New Phytol.*, 1952, 51: 1-10, bibl. 21, illus.

A short account of the bark anatomy of *Hevea brasiliensis* (together with an outline of commercial tapping) is given. Theories to account for the outflow of latex in tapping are discussed. It is shown that Frey-Wyssling's mathematical approach is inadequate and that further experimental work is required. The concept of suction pressure is discussed and its limitations in considering the water relations of latex are pointed out. The general conclusions of Arisz and Frey-Wyssling are retained in modified form, viz. that tapping of the latex vessel will lead to (a) exudation of latex; (b) changes in pressure within the latex vessel; (c) a flow of latex along great lengths of the latex vessel; (d) the entry of water into the vessel from the surrounding parenchymatous cells. An attempt has been made to view the problem of latex outflow in somewhat better perspective by considering the effects of progressive changes of turgor in the whole tissue and not merely the latex vessel itself. [Authors' summary.]—Univ. Cambridge and Sci. adv. Div., Minist. Food, London.

1315. GOODING, E. G. B.

Studies in the physiology of latex. II. Latex flow on tapping *Hevea brasiliensis*: associated changes in trunk diameter and latex concentration.

New Phytol., 1952, 51: 11-29, bibl. 15.

By the use of a sensitive dendrometer it was found that tapping led to contraction of the trunk of a *Hevea brasiliensis* in the region below the cut. There was a time lag in the appearance of contraction at points 1 ft. and 2 ft. below the tapping-cut. Contraction was progressively less with increasing distance from the cut. Ferrand's technique for taking samples of latex typical of that existing in latex vessels is discussed and critically examined. It was seen that tapping leads to dilution of the latex in the latex vessels below the cut and even to 2 ft. or more above the cut. There was a time lag in the appearance of dilution of the latex at points 1 ft. and 2 ft. below the cut, the rate of spread downwards of the dilution effect being similar to the rate of spread downwards of the contraction of the trunk following tapping. The rate of spread of the dilution effect was much slower in the lateral direction than in the downward direction. When a tree is brought into tapping for the first time, or after a long period of rest, tapping results in dilution of the latex throughout the tree. [Author's summary.]

1316. RUBBER RESEARCH INSTITUTE OF MALAYA.

Stump poisoning and root disease.

Circ. Rubb. Res. Inst. Malaya 36, 1952, pp. 3.

Problems to be faced in dealing with root disease in an old stand due for replanting are elimination of diseased stumps and roots (chiefly *Ganoderma pseudoferreum*) and the prevention of disease (*Fomes lignosus* and *F. noxius*) from becoming established on the healthy stumps. Where systematic root disease control has been carried out the former problem will not be important, but otherwise there is no safe alternative to the location and removal of all diseased trees and their roots. The latter problem is best dealt with by removing as much as possible of the healthy old stand but where circumstances rule out complete removal of stumps, stump poisoning must be undertaken and the following relatively inexpensive ring-barking method is tentatively recommended. As soon as possible after felling the bark is removed from the top 8 in. of the stump and the exposed wood is painted with a solution containing 5 lb. sodium arsenite in 1 gal. water thickened with 6 oz. tapioca flour. One gallon is sufficient for 65 stumps, and 45 can be treated per man-day.

1317. SCHWEIZER, J.

Het doden van oude hevea-aanplantingen met natrium-arseniet. (Killing old hevea plantations with sodium arsenite.) [English summary $\frac{1}{2}$ p.]

Bergcultures, 1952, 21: 340-9, bibl. 9, illus.

On the Sungei Rinchang Estate, Malaya, 700 acres of old hevea trees were treated with sodium arsenite to clear the land before replanting. One year after poisoning, most of the old trees were still standing but they had almost completely disappeared within 2-3 years. The cost of material and labour for poisoning was estimated at 25 cents per tree. Very little damage was observed on the young, newly planted trees; in one area 10% were damaged but only 2% needed to be replaced. There was a considerable amount of root disease in the old stand of rubber, but it is claimed that the roots of the poisoned trees decomposed within 6-18 months, and there was no evidence of loss in the new stand from root disease. In explanation of this it is suggested that although sodium arsenite has no direct effect on any parasitic fungi that may be on the roots of the poisoned trees, these are weakened by the death of the trees and are overcome by the saprophytic fungi in the soil. In evidence of the theory that ground cleared in this way may be replanted without serious danger from root disease, the case is cited of the tea estates in Indonesia on which the *Albizia* shade trees had been poisoned with sodium arsenite without any increase in the incidence of root disease on the tea bushes.

1318. SOESMAN, J. G.

Heveatapvlak-ziekten en haar bestrijding.

(Tapping diseases of hevea and their control.)

Bergcultures, 1952, 21: 243-5, illus.

The prevention and control of brown bast, mouldyrot, "spot canker" and "lump canker" of hevea are dealt with. Periodic tapping is recommended as preferable to tapping every third day. At the end of each tapping period the wound should be covered with a disinfectant in wax emulsion that will remain effective for at least 5 days. At the first sign of mouldyrot the bast should

be covered to 3 cm. above the point of infection with a warm emulsion of 60% hard wax, 30% acid-free tar and 10% carbolineum. For "spot canker" the infected bast, together with a 3 cm. wide ring of clean bast, should be scraped off down to $\frac{1}{2}$ cm. from the cambium and a circular cut made round the point of infection down to the wood; the following day this should be covered with warm asphalt. For "lump canker" the lump of latex and the abnormal growth of secondary xylem should be cut away to where the bast grows normally from the cambium; the following day the wound should be covered with the same preparation recommended for control of mouldyrot.

1319. BORGET, M.

Note-sur un essai de saignée du ceara, *Manihot glaziovii* Muell. Arg. réalisé à la station de Boukoko (Oubangui). (A note on a tapping trial with ceara rubber made at the Boukoko Station (Oubangui, French West Africa).)

Agron. trop., 1952, 7: 367-72, bibl. 11.

Various forms and frequencies of tapping were compared in 1951 on a plot of ceara rubber planted in 1944. The best yields of latex were obtained from frequent but light tapping working on bark from which the cork had been removed and using H_2SO_4 rather than HCl for coagulation. Even so the yield of about 60 kg. per ha. per annum was only about one-eighth that of unselected hevea.

Sugar cane.

(See also 1368a, h, i, k, l, m, o, y, 1369a, f, g, l.)

1320. BARBADOS.

A.R. B.W.I. *centr. Sugar Cane Breed.*

Stat., Barbados, for year ending Sept. 30th,

1951, pp. 47.

The report includes information on: *Plant cane trials*. The outstanding variety of the B.47 Series (bred in 1944) was B.4744 (Co.421 \times B.4098) which appears to be a general purpose cane and is being distributed in the coming season. B.47419 (P.O.J.2878 \times B.34104) also performed well, especially in intermediate and high rainfall areas, and is being distributed. *Third year seedling first ratoon trials*. B.46223 and B.46397 gave heavy yields of first ratoon cane under all ecological conditions but their juice quality was not outstanding. B.45151 (B.39254 \times B.34104) gave very heavy cane yields and is an excellent commercial variety except that the canes are relatively thin. *Third year seedling second ratoon trials*. None of the newer varieties was outstanding. *Select seedling ratoon trials*. B.41211 and B.41227 both gave heavy cane yields, the latter with the better sucrose content.

1321. DE WAAL, P. E., AND BEHRMANN, H. I.

Income and costs in sugar-cane growing.

Fmg S. Afr., 1952, 27: 403-7, bibl. 2.

Costs and incomes were determined for the 1949-50 crop on 71 farms in Natal representing a 10% sample of cane growers supplying each mill. Among the growers selected the average tonnage sold was 4,178 tons cut from 175 acres, averaging 23.9 tons per acre. This formed part of a total average acreage of 703 of which 411 acres, or 59%, were cultivated for cane production. The average capital investment was £25,409, cash

expenses and depreciation £5,095 and receipts £6,599, of which cane accounted for £6,126 or 92.7%. Average costs of production calculated by 2 methods worked out at 28s. 3d. and 23s. 8d. per ton respectively. Costs per ton declined slightly as the acreage in cane increased and more distinctly as the total tonnage of cane sold increased and were slightly higher for irrigated than for non-irrigated farms. Costs per ton on non-irrigated farms declined as yields rose to 28 tons per acre but this positive relationship was not shown so clearly for yields exceeding 28 tons.

1322. HANSCHALL, D. M.

Sugar cane experiments in Trinidad, 1951.

J. agric. Soc. Trin. Tob., 1952, 52: 155-61.

Fertilizer trials. The results are briefly recorded of experiments in which the following factors were studied: effect of increasing N, P and K on plant canes and on 1st, 2nd, 4th and 7th ratoons; effect on 7th ratoons of continued annual treatment with sulphate of ammonia since 1931; effect on 7th ratoons of urea compared with sulphate of ammonia. **Variety trials.** Plant canes: in 3 trials there was little to choose in cane yield between 5 varieties, but in juice quality B.34104 and B.4098 were slightly better than B.3337, B.41227 and B.43391, which were poor; in another trial B.37161 significantly outyielded B.34104 and B.37172. First ratoons: in seven trials B.3337 averaged the highest cane yield but was inferior in juice quality to B.37172, B.37161, B.4098 and B.34104; in another B.37161 gave the highest cane yield and in another B.4362 significantly exceeded all varieties except B.4098 and B.41227 in sugar yield. **Cultural trials.** Plant canes: the gains in yield from B.34104, B.37161 and B.37172 resulting from planting on 4 ft. compared with 6 ft. banks and the use of long compared with short plants were not significant. First ratoons: the use of long plants gave significant increases in cane and sugar with B.37161 and nearly significant increases with B.34104. Short plants of B.34104, B.37161 and B.37172 gave a significantly lower yield than long plants at 2 ft. apart, but there was little to choose at 1½ ft.

1323. HSIA, Y. J., CHUAN, L. T., AND WANG, C. S.

An appraisal of N: Co.310 cane. Results of extensive tests on Taiwan.

S. Afr. Sugar J., 1952, 36: 287-301, 349-55, 435-43, illus.

A detailed study has been made of N: Co.310 introduced to Taiwan from Natal in 1947. The results reported here cover the morphology of the variety with botanical illustrations, its growth characteristics and sugar content in different months, its germination and tillering at different times including the effects of inter-planting other crops on tillering, its fibre content and susceptibility to wind damage, its reactions to mosaic, red rot, pineapple and other diseases and to moth borers, and its yields of sugar and degree of tasseling in different areas. Comparisons are made in many cases with the standard variety F.108 and several other varieties commonly grown in Taiwan. The results show that N: Co.310 is a most promising cane, particularly for sandy sea coast areas, though it also grows well in clays. It tillered more freely than F.108, was wind-resistant, resistant to red rot and pineapple diseases and less susceptible to borer damage than other varieties. Yields of both autumn and spring planted canes and of

first ratoons were consistently higher than those of F.108, the average yield of sugar being 95% more than that of the standard variety.

1324. K[ING], N. J.

The new variety—Q.57.

Cane Grs' quart. Bull., 1952, 16: 48-9, illus.

A brief description of Q.57 (Q.27×Q.31) which is shortly being released to the industry. While not an early maturing cane it has better quality than Trojan early in the season. The variety has performed uniformly well in some districts but not others.

1325. GUILBEAU, W. F., BLACK, C. L., AND MARTIN, L. F.

A second season of pilot plant processing of sugarcane.

Sugar J., 1952, 15 (1): 15-17, 20, 34-6, bibl. 2.

A second season's results with a pilot plant confirm the value reported earlier [see *H.A.*, 22: 3143] of such tests as a means of assessing the factory behaviour of new varieties of cane. Wide ranges were found between varieties in average mud production values and clarity values. Excellent processing qualities found in C.P. 44-155 as a plant cane were confirmed in its first ratoon.—S. reg. Res. Lab., New Orleans.

1326. KING, N. J.

Factors affecting the germination of the sugar cane plant.

Proc. 19th Conf. Qd Soc. Sugar Cane Tech., 1952, pp. 133-41.

The author discusses the following factors as they affect the germination of cane setts: soil temperature, soil moisture, depth and compaction of the soil cover, nutritional status of the setts, plant hormones, soaking setts in water, soil tilth, soil organisms and soil insects.

1327. LUGO LÓPEZ, M. A., AND MARTÍNEZ, M. B.

Influence of subsurface tillage practices upon the infiltration capacity of a claypan soil planted to sugarcane.

Sugar J., 1952, 14 (12): 54-6, 82, bibl. 5.

Experiments on subsoiling and subsoil fertilization in progress in Puerto Rico in soils with heavy clay pans were described in an earlier paper [see *H.A.*, 22: 3117]. In the trial described here subsoiling, with and without mole drainage and with and without applications of lime and/or fertilizer to the subsoil, was compared with surface cultivation and undisturbed pasture with respect to their effects on the infiltration of water. The work was done in January and the infiltration tests made 8 months later in growing cane. The infiltration rates of water at the eighth hour were, in inches per hour, 0.5 for the undisturbed pasture, 5.6 for surface cultivation and 18.9-26.7 for the various treatments involving subsoiling.

1328. VAN DILLEWIJN, C.

Respiration in cane—a neglected subject?

Sugar, N. York, 1952, 47 (7): 45-6, bibl. 11, illus.

The author refutes a statement by Hes,* that "as far as we know there is no quantitative information about respiration processes, at least not in the Java-literature".

* Hes, J. W. The respiration of the stem of ripening sugar cane. *Proc. Acad. Sci. Amst.*, 1949, 52: 914-20.

by reviewing the literature from Java and other countries on the respiration of cane leaves and roots. It is concluded that the stage of acquiring preliminary information was passed many years ago, and that what is needed now are detailed investigations aimed at widening fundamental knowledge on the process and applying it to the practice of cane growing.

1329. THAKUR, C.

Accessory buds in sugarcane.

Curr. Sci., 1952, **21**: 192-3, bibl. 3.

The occurrence of multiple buds at a node in sugar cane as reported by Raghavan [see *H.A.*, 22: 3111] is not a new phenomenon. It is suggested that accessory buds may arise through the loss, most probably through external agencies, of apical dominance. If the apical bud subsequently renews normal growth no further formation of multiple buds occurs on other nodes.

1330. ROBINSON, J. B. D.

A comparative study of some soil nutrients in the coralline sugar-cane soils of Barbados.

J. Soil Sci., 1952, **3**: 182-9, bibl. 11.

Following investigations by Saint between 1928 and 1932 recommendations on the manuring of cane on coralline soils in Barbados with F.Y.M. supplemented with N and K and with grass or trash mulches applied to plant canes have been generally followed. No trash has been burnt. Fields analysed in 1929-1932 were sampled and analysed by the same methods in 1947. Comparisons between the two sets of results show that during the 15 to 18-year period there has been a mean increase in soil organic carbon of 41%, and in exchangeable soil K_2O of 21.5%. Comparative results for total soil K_2O , total P_2O_5 and water-soluble P_2O_5 are inconclusive.

1331. RAHEJA, P. C.

Analysis of sugarcane yields. II. Relative influence of season, irrigation intervals, methods of planting and nitrogen doses on yield and quality of cane.

Indian J. agric. Sci., 1951 (issued 1952), **21**: 203-14, bibl. 17.

Three irrigation intervals, 3 methods of planting and 3 levels of N were compared for cane grown at Tarnab over 4 seasons. Climatic variations from year to year had a pronounced effect. Irrigating at 7 and 10 day intervals gave comparable cane yields, but withholding water until soil moisture reached the critical level gave significantly better C.C.S. per cent values with a result that there were no significant differences in sugar yields between the 3 treatments. Covered furrow planting gave significantly better yields than open furrow or flat planting. There were significant linear interactions between the irrigation interval and planting method for C.C.S. per cent values and sugar yields, the richest juices resulting from the covered furrow planting followed by the least frequent irrigation treatment. Responses to N varied with the season, but in general the medium dressing of 100 lb. per acre would appear to be optimal.

1332. RAHEJA, P. C.

Growth studies on *Saccharum officinarum*. III. Manurial series.

Indian J. agric. Sci., 1951 (issued 1952), **21**: 215-29, bibl. 14.

The effects were studied over 3 years of 3 basic treatments involving green manure or compost, 2 top dressings of organic matter containing 100 and 135 lb. N per acre compared with a top dressing of artificials containing 75 lb. each of N and P_2O_5 , and 3 frequencies of irrigation. In a second experiment over 4 years 3 levels of N, 50, 100 and 150 lb. per acre, were compared for 3 planting methods and the same 3 frequencies of irrigation [see abstract 1331]. In the first experiment neither the basic manuring nor top dressings showed clear and consistent effects on growth measurements or yields and C.C.S. per cent values. In the second experiment 150 lb. N tended to produce the greatest cumulative growth in length during the formative and major growth phases but the least during the senescent phase, with a result that only in 2 years out of 4 were differences in ultimate height as between 50 and 150 lb. significant.

1333. ANAKAPALLE SUGAR CANE RESEARCH STATION.

Biochemical studies on the ratoon crop.

A.R. Madras Dep. Agric. agric. Stats 1949-50, 1952, pp. 12-27.

In studies conducted in 1948-50 to find out the factors responsible for the differences in yield between ratoons and the plant crop, soil and plant samples taken at different stages of growth were analysed to discover the availability in the soil, the amount, and the rate of uptake of mineral nutrients. Detailed results are given. N was found to be the chief factor in limiting ratoon yields. The amount and rate of uptake of N were highest in plants, followed by first ratoons and then by second ratoons. The ratoons had the highest percentages of sucrose and C.C.S., the second ratoon being the richer, but it is not considered economical to ratoon more than once.

1334. ANAKAPALLE SUGAR CANE RESEARCH STATION.

Ratoon experiment.

A.R. Madras Dep. Agric. agric. Stats 1949-50, 1952, pp. 6-7.

The effects of combinations of graded doses of N (100-200 lb./acre) and P (0-100 lb.) on plants, first ratoons and second ratoons were studied in a 3-year, replicated experiment completed in 1949-50. Plants gave a significantly higher yield than first ratoons, and first ratoons than second ratoons. 150 lb. and 200 lb. N tended to yield more than 100 lb. First ratoon yields were raised to those of plants by applying higher doses of N. With doses of N over 100 lb. there was a slight depression of juice quality. P caused no improvement in yield or juice quality.

1335. LOCSIN, C. L.

Foliar diagnosis or leaf analysis in the Victorias sugarcane district.

Sugar News, 1952, **28**: 193-7, bibl. 4.

In experiments in Victorias the Clements crop-logging technique [see *H.A.*, 19: 1584] was found to be a useful means of determining the nutrient status of a growing crop, but further investigations are required for determining the optimum nutrient levels of various plant foods in the different varieties at various ages and months of the year. The number of days' interval to allow after heavy rain before sampling and the maximum daily rainfall that has no effect on leaf samples

are points requiring evaluation before moisture indexes can be fully interpreted. The results of several experiments are given.

1336. SAMUELS, G., AND OTHERS.

Fertilizers for sugarcane.

Sugar J., 1952, 14 (12): 58-62, 82, bibl. 4.

From a brief review of fertilizer investigations in Puerto Rico it is concluded that: (1) N produces the greatest yield response, the optimal range being 100-225 lb. N per acre; (2) P gives little response, a maximum of 30-40 lb. P_2O_5 per acre being sufficient; (3) lack of K reduces yields slightly and 90 lb. K_2O per acre are considered sufficient under normal conditions; (4) minor elements have had no significant effects on yields or sucrose; (5) the use of fertilizers has not appreciably affected sucrose contents; (6) the practice of burning trash eventually lowers cane yields and reduces soil fertility; (7) no appreciable differences have resulted from applying fertilizer on the surface, in bands beneath the surface or in split applications; and (8) foliar diagnosis shows promise as a means of assessing fertilizer needs more accurately.

1337. SAMUELS, G., AND CAPÓ, B. G.

Effects of level of a fertilizer element on the uptake and concentration of that element and other elements in a plant.

Agron. J., 1952, 44: 352-7, bibl. 5.

In experiments at Río Piedras Experiment Station, Puerto Rico, sorghum, sugar cane and coffee received various treatments in which one element was varied in the presence of fixed concentrations of the others. The experiment covered 12 soil types which received different levels of N, P, K and Ca. Application of each one of these to the soil was accompanied by an increased concentration of it in the plant. Increased concentration in the leaf with applications to the soil tended to disappear with increasing age of the plant. N applications did not significantly affect leaf P, increased leaf K in sugar cane but not materially in coffee, and did not affect leaf Ca in coffee. P additions lowered leaf N in sorghum and sugar cane, increased leaf K in sugar cane and reduced leaf Ca in coffee. K additions reduced leaf N and leaf Ca, and did not affect leaf P consistently. Ca additions increased leaf P and K in coffee, caused no significant change in leaf N in coffee, lowered leaf N in sorghum, and had no consistent effect on leaf P.

1338. SAMUELS, G., LUGO LÓPEZ, M. A., AND LANDRAU, P., JR.

Influence of the handling of sugar cane trash on yields and soil properties.

Soil Sci., 1952, 74: 207-15, bibl. 10.

SAMUELS, G., LANDRAU, P., JR., AND LUGO LÓPEZ, M. A.

Handling of sugar cane trash: its effects on yields and soil.

Sugar, N. York, 1952, 47 (4): 47-9, bibl. 8, illus.

An experiment was started in 1945 on a silty clay soil at Río Piedras, Puerto Rico, in which sugar cane trash was (1) spread evenly and burnt, (2) buried in furrows about 1 ft. deep between the rows, or (3) aligned in alternate rows. Treatments were started after the harvest of the plant cane crop and were repeated each year

for 6 ratoon crops. No significant differences in yields of 96° sugar occurred in the first 4 ratoons, but in the 5th and 6th ratoons, aligning trash gave significantly higher yields than burning trash, burying trash being intermediate. Observations indicated that aligning trash also reduced weeding costs compared with the other treatments, but differences in soil properties, including pH, total N, and various physical measurements had not become pronounced, although a trend towards slower permeability in burnt plots was becoming apparent.

1339. MAIER, E. A.

A story of sugar cane machinery.

Sugar J., 1952, 15 (4): 29-31, illus.

This last chapter of the book briefly mentioned in *H.A.*, 22: 3129 is devoted to the haulage of sugar cane, including the use of derricks and field hoists. The book is obtainable from *Sugar Journal*, New Orleans.

1340. ABRAHAMSON, B. H.

The Nkweleni self-loading trailer. Successful field tests carried out.

S. Afr. Sugar J., 1952, 36: 417-21, illus.

The trailer consists primarily of a strong overhead beam carried at the rear of an arched frame mounted on 2 wheels; the front is mounted directly on the rear-axle of a wheel tractor. For loading, angle pieces and chains are laid on the ground and a stack 25 ft. x 5 ft. x 5 ft. weighing 6 to 7 tons built over them. The trailer is backed over the stack, the chains attached and the load lifted hydraulically. With a 1-mile haul the trailer can handle 12 loads in 8 hours.

1341. SMITH, N. M.

Some observations on frost injury to sugar cane—Nambour area.

Proc. 19th Conf. Qd Soc. Sugar Cane Tech., 1952, pp. 123-32, bibl. 1, illus., and *Cane Grs' quart. Bull.*, 1952, 16: 25-33.

Following damaging frosts occurring under dry conditions in July and August, 1951, observations were made weekly on 2 light coloured canes, C.P.29/116 and Q.47 and 2 dark coloured varieties, Q.42 and Trojan. Frost injury symptoms are described in detail. To determine the extent of frost injury to an eye it was found necessary to adopt the positive method of viewing a section longitudinally. The observations showed that: (1) there are varietal differences in resistance to apical bud and eye damage, the 2 dark coloured varieties being the more resistant in this case; (2) the dark canes were also more resistant to rotting; (3) the 2 green varieties tended to maintain their C.C.S. contents; (4) subsequent rain depressed the C.C.S. content of all varieties and increased the fibre content of severely damaged canes. Where stools of young plants or first ratoons remained alive but were not harvested the best subsequent ratooning followed intercultivation with a high N application just before the summer.

1342. HUGHES, C. G.

Diseases of cane in New Guinea.

Cane Grs' quart. Bull., 1952, 16: 39-42, illus.

Diseases observed in native canes by the author during an expedition to New Guinea in 1951 included downy mildew, eye spot, yellow spot, pokkah boeng, Fiji disease and mosaic, all of which had been recorded previously, rind disease, red rot, schizophyllum rot,

red rot of the leaf sheath, banded sclerotial disease and rust which had not been previously recorded in New Guinea, and 4 unknown diseases, namely, 2 types of leaf stripe, a leaf spot and a disease causing pustules on the leaves. A fuller account of these observations will appear as a Technical Communication of the Qd Bureau of Sugar Experiment Stations.

1343. KING, N. C.

Chlorotic streak in Natal cane.

S. Afr. Sugar J., 1952, 36: 423.

The symptoms of this virus disease, which has now appeared in Natal, are described and control by roguing and the hot water treatment of setts mentioned.

1344. HUGHES, C. G.

Testing sugar-cane varieties for resistance to leaf-scald diseases.

Cane Grs' quart. Bull., 1952, 16: 12-15, illus.

The method of conducting bacterial leaf-scald resistance trials on cane varieties is outlined. From these trials and field observations varieties have been classified as follows: (1) highly resistant, Atlas, C.P.29/116, Comus, D.1135, Eros, Pindar, P.O.J.2725, P.O.J.2878, Q.50, Q.813, Vesta; (2) intermediate, Badila, Cato, Korpi, M.1900 S., Pompey, P.O.J.2714, Q.10; (3) susceptible, E.K.28, Orion, S.J.4, Trojan; and (4) very susceptible, H.Q.426, Mahona, Orambo, Q.44, S.J.2.

1345. STEINDL, D. R. L., AND SMITH, N. M.

Sclerospora disease.

Cane Grs' quart. Bull., 1952, 16: 7-9, illus.

A recent outbreak of this hitherto unimportant disease has occurred in Queensland in cane areas that had been subjected to flooding. The symptoms of the disease and the *Sclerospora* sp. responsible are described briefly. Diseased stools should be dug out to prevent spores being returned to the soil, and, in districts where the disease occurs, no planting material should be taken from crops growing on land that has been flooded.

1346. WILSON, G.

Benzene hexachloride for cane grub control. Variations from standard methods of application and disadvantages arising therefrom.

Proc. 19th Conf. Qd Soc. Sugar Cane Tech., 1952, pp. 147-53.

The adverse effect of applying BHC mixed with fertilizers on cane germination and yields [see H.A., 22: 1968] has been confirmed in further trials. Placing BHC above cane setts which were protected by a layer of soil resulted in better germination than when BHC was placed below the plants. Deep placement of BHC gave less complete grub control than shallow placement. In preliminary trials, dieldrin, aldrin, chlordane and E.605 also had adverse effects when in contact with cane roots.

1347. RAO, G. N.

Schizotetranychus andropogoni Hirst, a pest of sugarcane.

Curr. Sci., 1952, 21: 163-4, bibl. 4.

This mite, now recorded for the first time in S. India on sugar cane, attacks the leaves, causing them to turn yellow and dry up. The susceptibility of commercially important varieties of cane is to be tested.

Tea.

(See also 1317, 1368t.)

1348. TEA RESEARCH INSTITUTE OF CEYLON.

Annual Report of the Tea Research Institute of Ceylon for the year 1950, being *Bull.* 32, 1952, pp. 58.

Information is given on: *Chemical Division*: blister blight, copper residues, effects of frequency of plucking, of shade and of spraying and dusting on the composition of leaf, quick withering experiments at high temperatures. *Physiology*: selection and vegetative propagation of clones for yield and blister resistance, control of mosses and lichens, green manures, weed-killers, manurial and pruning cycle increment experiments. *Pathology*: blister blight loss of crop experiments, crop protection of tea recovering from pruning, systemic fungicide trials, *Cercospora*, *Corticium invisum*, *Poria helopeltis*, shot-hole borer control.

1349. INDIAN TEA ASSOCIATION, TOCKLAI.

Annual Report of the Indian Tea Association, Scientific Department, Tocklai Experimental Station, for 1951, 1952, pp. 36.

The report includes information: *Agrobotanical*: Physiology and propagation; phloem index as a function of phenotype; correlation between top dressing dosages of minor elements and growth; nutrient values of urea, oil cake and sulphate of ammonia; influence of tree canopy shade on yield; agrototype the determining factor in growth response to sulphate of ammonia. *Agronomics and breeding*: planting distance and yield; quality; breeding. *Biochemical*: Time of plucking; withering. *Pathological*: Mycology: control of black rot (*Corticium* spp.), blister blight and root disease. *Entomology*: pink mite, tea seed bug, mound termites, cricket, plant lice, red spider, acaricides, incorporation of dyes into sprays as indicators of coverage. *Advisory*: Manurial experiments; shade and N relations, and plucking experiments.

1350. INDIAN TEA ASSOCIATION.

Proceedings of the 9th Annual Conference of the Indian Tea Association, Tocklai Experimental Station, 1951, 1952, pp. 75 + 7.

Papers given included: *Physiology*: Research on the use of N under shade [see abstract 1358]. *Chemistry*: Some soil problems. *Biochemistry*: Experiments on withering.

1351. U.P.A.S.I.

Annual Administration Report, United Planters' Association of Southern India, Tea Scientific Section, for 1951-52, 1952, pp. 31.

Entomological section: *Helopeltis* control by DDT; red spider and other mites, eelworm, experimental control by DDT of the capsid bug *Ragnus importunitas*?, a pest of the cover crop, *Crotalaria anagyroides*. *Chemistry section*: copper content of leaf, fertilizer and soil amendment experiments. *Botany section*: leaf diseases, chiefly blister blight; stem disease including red rust (*Cephaleuros parasiticus*); root disease; seedling diseases; weedkiller trials. [See also abstract 1362.]

1352. VINK, A. P. A., AND KAMPFRAATH, A. A. **Arbeidsverdeling in de thee-cultuur. (Distribution of work in tea plantations.)** *Bergcultures*, 1952, 21: 172-81, bibl. 1.

The distribution of labour between the various cultural operations throughout the year on a 500 ha. tea plantation is analysed with the aid of graphs.

1353. PIZEY, R. M.

The manufacture of tea leaf from individual bushes. Experiments in Assam.

Tea & Rubb. Mail, Jan. 1952, reprinted in *Plant. Chron.*, 1952, 47: 241-4.

Interest in the performance of individual bushes led the author, when tea planting in Assam, to construct a miniature roller capable of dealing with samples as small as 1½ oz.; this subsequently developed into the "multiple tea roller" now marketed. Records kept on individual bushes showed yields and quality to vary greatly both over a year and from one season to another even where bushes appeared similar. Special characteristics and abnormalities observed in certain bushes are mentioned.

1354. DAVIES, R. M.

An account of the vegetative propagation of tea in Ceylon.

Rhod. agric. J., 1952, 49: 229-34, bibl. 1, illus.

A well-illustrated account is given of the Ceylon method of propagating tea from single-leaf cuttings. The transplanting tool designed by D. S. Cameron is also described, and a brief account given of the layout and management of clone testing plots.

1355. GORRIE, R. M.

Soil erosion in Ceylon tea.

World Crops, 1952, 4: 265-7, 277, illus.

Whereas in the nineteenth century coffee was grown in Ceylon on steep slopes without regard to soil erosion, when it was succeeded by tea better soil management on some estates effectively reduced erosion. Now that large estates are in many cases being divided into small holdings progress in soil conservation has been checked and many areas are found in which there are no contour drains or silt pits, no fertilizers used, no green manure crops grown and weeding done with heavy unsuitable tools. A Soil Conservation Act was enacted in 1951 but has not yet been put into force. Some of the problems involved are discussed.

1356. MOLLISON, I. A.

Desmodium ovalifolium as a cover crop for tea.

Tea Quart., 1952, 23: 53.

A case is mentioned in which *D. ovalifolium* cuttings, planted in alternate rows concurrently with tea, suppressed weed growth and soil wash on a steep slope without checking the growth of the tea plants. *Indigofera endecaphylla* planted a year later in an adjoining clearing did not suppress weeds effectively but tended to smother the young tea plants.

1357.* EDEN, T.

The nutrition of a tropical crop as exemplified by tea.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 7.

The author summarizes the data yielded by eighteen years' continuous experiments on tea. The nature of the experimental control adopted is described. Data are

* See note, p. 3.

provided to illustrate the effect of varying phases of growth on nutrient response (NPK). Total yield and nutrient response exhibit a definite pattern in the intervals between successive pruning operations. Nutrient efficiency increases in successive stages of the pruning cycle. Response is linear for nitrogen applications up to 80 lb. per acre. Response to phosphate is asymptotic above 30 lb. P_2O_5 per acre. Potash has shown delayed symptoms of deficiency which subsequently became the most severe of all. There was no evidence of nutrient interaction. The relationship between crop, maintenance, foliage and wood growth was linear for all pairs. A balance sheet of nutrient removal is given and the increase in long term efficiency of nutrient response is discussed. [Author's summary.]

1358. WIGHT, W.

Summary of ten years' research on the use of sulphate of ammonia under shade.

Proc. 9th annu. Conf. Indian Tea Ass. Tocklai 1951, 1952, pp. 4-12.

Shade, as represented by sau trees [*Albizzia moluccana*] at 40×40 ft. reducing light intensity by 50%, can replace and is equivalent to 80-100 lb. N per acre, supplied as sulphate of ammonia. N becomes less effective as shade increases and for some kinds of tea there is no benefit in combining N and shade. The use of shade sets an upper limit to yield, a limit which can only be exceeded by entirely dispensing with shade and replacing it by more than 80 lb. N. But tea growing in full sun with full use of N would cause early exhaustion of soil and bushes and a crop rotation would be necessary. Tea growing under shade—in which a limit is set to yields and manures are not needed—is a sound system.

1359. TIDEMAN, P.

Een proefneming met mechanische pluk van thee in Indonesië. (An experiment on mechanical tea plucking in Indonesia.)

Bergcultures, 1952, 21: 197-205, bibl. 1, illus.

In a trial in Indonesia with a modified flexible shaft Tarpen tea cropper, type 48, mechanical plucking in recently pruned tea gardens gave lower yields than hand plucking. Whether this reduction of yield would be permanent remains to be investigated. With mechanical plucking a cycle of 14 days gave higher production than a cycle of 21 days. Heavy manuring had a greater effect on the yield of mechanically plucked tea, especially with a long cycle, than on that of hand plucked tea. With mechanical plucking a long cycle had the disadvantages of decreasing the percentage of useable leaf and increasing the danger of blister blight infection. The cost price of tea plucked mechanically was higher than that of tea plucked by hand. The performance of the machine is compared with that of type 46A used in Ceylon. It is concluded that further trials over a wider range of conditions are needed before mechanized plucking can be used on a large scale.

1360.* PORTSMOUTH, G. B.

The control of blister blight disease of tea.

[*Mim. Pap.*] 13th int. hort. Congr., London, 1952, pp. 6, bibl. 5.

1. The history of this disease of tea, caused by the fungus

* See note, p. 3.

Exobasidium vexans Mass. is outlined. The disease was first described from Assam in 1868. In 1946 it became epidemic in South India and Ceylon, causing much alarm. It has now spread to Sumatra, Malaya and Java. 2. Features in the life history of *Exobasidium vexans*, which have a bearing on control, are described. 3. Conditions under which tea is grown in Ceylon are also outlined. 4. When the disease first appeared in Ceylon a number of alterations in existing agricultural practices were immediately recommended. Meanwhile, research into the life history of the fungus and extensive trials with fungicides were started. By the end of 1949 control by low volume spraying with copper fungicides appeared practical. 5. Estate scale trials in 1950 proved that low volume spraying, every 7-10 days, gave economic control under all weather conditions. 6. Extensive spraying of copper fungicides by means of knapsack sprayers was successfully adopted by the Ceylon tea industry in 1951. In the same year, new trials indicated that low application rates of dusts containing 4% or 6% of copper would also give satisfactory control. [Author's summary.]

1361. LAOH, J. P.

Een beschouwing over de technische en economische mogelijkheden van de motorpoederverstuiving van koperfungiciden met inheemse draagstoffen bij de bestrijding van de blister blight. (A survey of the technical and economic possibilities of power dusting with copper fungicides and local [Indonesian] carriers for the control of blister blight.)* *Bergcultures*, 1952, 21: 192-5, bibl. 4.

In young, easily accessible tea plantations spraying may be more economic than dusting as the cost of materials is less, but in mature gardens dusting is preferable, as it makes smaller demands on labour and a larger area may be covered in a given time. The costs of the various forms of the copper materials used for control of blister blight are compared. Preliminary trials with a whirlwind duster indicate that volcanic tufa and pumice stone tufa are the best carriers for copper dusts. The problem of copper residues from sprays and dusts is discussed.

1362. VENKATARAMANI, K. S.

Cylindrocladium disease.

A.R. U.P.A.S.I., Tea sci. Sect., 1951-52, 1952, p. 27, illus.

A small scale attack by a species of *Cylindrocladium* not previously recorded on tea in South India was observed on the roots of tea bushes on a river bank in Central Travancore in 1951. The chief symptoms were the entire absence of feeding roots, the presence of lesions up to 15 mm. across all over the bark of the tap and lateral roots, and shedding of affected bark. It has not been determined whether the fungus is a primary pathogen.

1363. D[As], G. M.

Scavenger termites.

Serial Tocklai 94, 1952, pp. 4.

Scavenger termites are secondary pests of tea. They occur only in dead wood, but may prevent adjoining healthy wood from callusing. Preventive measures include control of fungi and borers which cause wounds or kill wood and the removal of dead wood. The soil

* A fuller account is being published in *Archief voor de Theecultuur*.

around bushes infested with termites should be treated by forking in 5% BHC at 1-2 oz. per bush. Where termite nests are located these can be treated by watering in 2-3 oz. of 10% DDT or 5% BHC or by fumigation with Cyanogas.

1364. KRISHNAMURTHY, K., VENKITASUBRAMANIAM, T. A., AND GIRI, K. V.

Circular paper chromatographic analysis of the amino acids of tea and coffee infusions.

Curr. Sci., 1952, 21: 133, bibl. 3, illus.

A technique is described briefly by means of which aspartic acid, glutamic acid, leucine (and iso-leucine), phenyl-alanine, valine, alanine, serine, asparagine, tyrosine, arginine, histidine, lysine and proline have been identified in a tea infusion. A coffee infusion contained very much smaller amounts of amino acids.

Sundry crops.

1365. LYNCH, S. J., LARSON, E., AND DOUGHTY, D. D.

A study of the edibility of akee (*Blighia sapida*) fruit of Florida.

Proc. Fla. St. hort. Soc. for 1951, pp. 281-4, bibl. 13, illus.

Feeding tests on animals with akees have shown that the arils of "yawning" fruits (opened on ripening either on the tree or after picking) are non-toxic, whereas the arils of "non-yawning" (closed) akees are toxic, as are the seeds of either ripe or unripe fruits.

1366. EVERETT, P.

The cherimoya: a delicious dessert fruit.

N.Z. J. Agric., 1952, 84: 168.

The cherimoya (*Annona cherimola*) can be grown in favourable localities in New Zealand. It is not recommended for commercial planting, but when planted in large private gardens that are relatively frost-free it is both ornamental and useful. Notes are given on its propagation from seed and by budding. No diseases of the cherimoya are known in New Zealand, but thrips commonly attack the under side of the foliage and the growing fruits. This pest can be controlled by spraying with nicotine sulphate 1: 600 plus soft soap 3 lb. per 100 gal.; usually more than one application is necessary.

1367. SESHAGIRI, P. V. V., AND SASTRI, R. L. N.

T.A.N. changes in the leaves of *Tamarindus indica* Linn.

Curr. Sci., 1952, 21: 190, bibl. 5.

The titratable acid number (T.A.N.) in tamarind leaves was highest in the winter months at Waltair, but did not show the diurnal fluctuations observed elsewhere in other members of the Crassulaceae. The pH declined as leaves aged, and then rose again.

Noted.

1368.

a ALAMO IBARRA, R.

Perspectivas para el control permanente del borer de la caña de azúcar (*Diatraea*), en el continente sudamericano. (Prospects for the permanent control of sugar cane borer in South America.)

Agric. venezol., 1952, 17 (154): 12-13, illus. A plea for more biological control methods.

- b DE ALMEIDA PRADO, S. P.
O café no Espírito Santo. (Coffee growing in the State of Espírito Santo [Brazil].) *Folha da Manhã*, 30 April and 8 May, 1952, reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1952, 27: 419-25.
- c ANON.
Cinchona and quinine expansion in Madras State, India.
For. Commerce Wkly, Wash., 1951, 45 (8): 19, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 88.
Information on the 2 government cinchona plantations and factories.
- d ANON.
Mexico; de ananas-productie. (Pineapple production in Mexico.)
Lat. Amer., 1952, 6 (1): 13, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 119.
- e ANON.
O café no norte do Paraná. (Coffee growing in north Paraná.)
Estado de São Paulo, 11-28 March, 1952, reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1952, 27: 238-81, map.
A comprehensive survey.
- f BRUNER, S. C., AND VALDÉS BARRY, E.
Notas sobre el control biológico del picudo negro del plantano. (Notes on the biological control of the black banana borer [*Cosmopolites sordidus*].)
Rev. Agric., Cuba, 1951, 34: 90-9, bibl., illus., from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 183.
- g BUSH, R.
Fruit in Jamaica.
Fruit Year Book, 1953, pp. 23-9, illus.
Banana, citrus, strawberry, pineapple and tomato.
- h BUZACOTT, J. H.
The sugar cane varieties of New Guinea.
Cane Grs' quart. Bull., 1952, 16: 43-4.
- i BUZACOTT, J. H.
Varietal changes in the Burdekin district.
Proc. 19th Conf. Qd Soc. Sugar Cane Tech., 1952, pp. 155-9, bibl. 4.
In 1950 Trojan became the leading cane variety.
- j CEYLON RUBBER RESEARCH INSTITUTE.
Tapping systems.
Adv. Circ. Rubb. Res. Inst. Ceylon 34, 1952, pp. 5, illus.
Supersedes *Adv. Circ.* 17, from which it hardly differs.
- k CONNOLLY, P. J.
Warfarin for rat control in cane fields.
Sugar, N. York, 1952, 47 (5): 54-5, illus.
- l COURTICE, N.
The eradication of downy mildew in the Bundaberg area.
Cane Grs' quart. Bull., 1952, 16: 22-4.
The last recorded diseased cane stool was dug out in 1950.
- m DARUVALLA, D. N., AND KAMATH, V. G.
Utilization of sugar industry waste: Mineral wool from filter press mud.
J. sci. industr. Res., India, 1952, 11A: 412-13, bibl. 1.
- n FAIRCHILD, D.
The mango relatives of Cochin China—those with five-stamen flowers.
Proc. Fla St. hort. Soc. for 1948, pp. 250-5 [received Nov. 1952].
- o F.A.O.
Sugar.
Commodity Bull. F.A.O. 22, 1952, pp. 131, 2s. 6d.
Mainly consumption and retail prices. See also *H.A.*, 21: 4035.
- p GIESBERGER, G.
Toevoeging van formaline (formaldehyde) aan rubberlatex ter voorkoming van voorcoagulatie resp. van de vorming van gasbelletjes in sheets. (The addition of formalin (formaldehyde) to rubber latex to prevent pre-coagulation and the formation of gas bubbles in sheets.)
Bergcultures, 1952, 21: 317-19.
- q VAN GILS, G. E.
Het gebruik van formaldehyde voor de conservering van latex. (The use of formaldehyde for the storage of latex.)
Bergcultures, 1952, 21: 319-21, being *Ber. I.N.I.R.O.* 198.
- r HAANSTRA, W., AND ZEEHUISEN, J. J.
De technische classificatie van natuurrubber. (The technical classification of natural rubber.)
Bergcultures, 1952, 21: 109-13, bibl. 2, illus.
- s HALL, M. M.
Coffee in Hawaii.
Coffee Tea Industr., 1951, 74 (11): 19, 33, from abstr. in *DocumBl. trop. Prod. Amst.*, 1952, 7: 51.
- t HARLER, C. R.
Tea in Burma and the Shan States.
Tea and Rubb. Mail, Feb. 1952, reprinted in *Plant. Chron.*, 1952, 47: 346-51.
- u I.N.E.A.C.
Bulletin climatologique annuel du Congo belge et du Ruanda-Urundi: Année 1950. Idem: Année 1951.
(Annual meteorological bulletins of the Belgian Congo and Ruanda-Urundi, 1950 and 1951.)
Communs Bur. climatol. I.N.E.A.C. 4 and 5, 1952, pp. 103 and 99.
Comprehensive records of rainfall, temperatures, humidity, insolation and evaporation.
- v JOHN, C. M.
Crotalaria striata green manure crop for coconut plantations.
Bull. Indian centr. Coconut Cttee, 1952, 6: 25-8.

- w KHANNA, K. L., AND CHACRAVARTI, A. S.
Studies in storage of *gur*.
Indian J. agric. Sci., 1951 (issued 1952),
21: 245-51, bibl. 2.
- x VAN KRETSCHMAR, J. A.
Koffie in Congo. (Coffee growing in the
Congo.)
Meded. Afr. Inst., 1952, 6: 12-15, illus.,
from abstr. in *DocumBl. trop. Prod. Amst.*,
1952, 7: 216.
- y LOCSIN, C. L.
Summary of 1951-52 sugar cane variety tests
harvested to-date by the Victorias Milling
Co., Inc. Experimental Department.
Sugar News, 1952, 28: 248-9.
H37-1933 was the leading variety.
- z M., R. G.
Experimentos de control de las hormigas
"minadoras" (*Myrmela chista* sp. y otras)
del cafeto. (Experiments in the control of
the "mining" ants (*Myrmela chista* and
other species) of the coffee bush.)
Bol. inf. Colombia, 1952, No. 31, pp. 45-7.
Effective control was obtained with the 5
insecticides tried.
- 1369.
- a MARTIN, F.
La canne à sucre dans les territoires de la
France d'Outre-mer. (Sugar cane produc-
tion in the French colonies.)
Rev. int. Prod. colon., 1952, 27: 12-13, 15-16,
from abstr. in *DocumBl. trop. Prod. Amst.*,
1952, 7: 215.
- b MERLE, P.
Premières observations sur la fructification
des papayers males. (Preliminary observa-
tions on the fruiting of male papaws.)
Fruits d'Outre Mer, 1952, 7: 178-9, bibl. 2,
illus.
- c MONNET, J.
L'emballage de la banane de Chine ou
banane de Canaries en Guinée française.
(Packing Cavendish bananas in French
Guinea.)
Fruits d'Outre Mer, 1952, 7: 274-86, bibl. 3,
illus.
- d PY, C.
Note sur la culture de l'ananas en Côte
d'Ivoire. (Note on pineapple cultivation in
the Ivory Coast.)
Bull. Féd. Ass. ban. fruit. Côte d'Ivoire 9,
1951, pp. 6, from abstract in *Fruits d'Outre
Mer*, 1952, 7, Suppl. I.F.A.C. p. 195.
A comparison of Ivory Coast cultural
methods with those practised in New
Guinea, Hawaii and Puerto Rico.
- e PY, C.
L'ananas à Cuba. (Pineapples in Cuba.)
Fruits d'Outre Mer, 1952, 7: 180-2, illus.
- f RAGHAVAN, T. S.
Sugarcane × bamboo hybrids.
Nature, 1952, 170: 329-30, bibl. 5, illus.
- g RAMOS NUÑEZ, G.
Caña. (Sugar cane [in Colombia].)
Agric. trop. Bogotá, 1952, 8 (9): 9-14.
- h RUBBER RESEARCH INSTITUTE OF CEYLON.
Notes on budgrafting procedure.
Adv. Circ. Rubb. Res. Inst. Ceylon 1,
revised, 1952, pp. 6, illus.
Differs little from 1943 edition [see *H.A.*,
14: 1358].
- i RUBBER RESEARCH INSTITUTE OF CEYLON.
The control of bark rot and canker bark rot.
Adv. Circ. Rubb. Res. Inst. Ceylon 21
(revised), 1952, pp. 5.
No change from the 1944 circular [see *H.A.*,
14: 1916].
- j RUBBER RESEARCH INSTITUTE OF MALAYA.
Application of the R.R.I. bleaching process
to the preparation of white latex crepe.
Circ. Rubb. Res. Inst. Malaya 35, 1952,
pp. 4.
- k SCHNELL, R.
Végétation et flore des Monts Nimba.
(Vegetation and flora of the Nimba moun-
tains [in French North Africa].)
Vegetatio, 1952, III (1951): 350-406, bibl.
114, illus.
- l SYMES, E. L.
Leaf analysis or foliar diagnosis.
Sugar J., 1952, 15 (2): 18-19, 22-3, bibl. 19.
Of sugar cane reviewed.
- m VARELA MARTINEZ, R.
Comercio internacional de bananos en 1951.
(International trade in bananas in 1951.)
Agric. trop. Bogotá, 1952, 8 (9): 17-20, illus.
- n ZILL, L. H.
Observations of some of the newer mangos
during the year of 1950.
Proc. Fla. St. hort. Soc. for 1950, pp. 219-20
[received Nov. 1952].
Notes on Keitt, Lippins, Oliver, Edward
and Pettigrew.

NOTES ON BOOKS AND REPORTS.

Books.

1370. BAYNES, K., AND SCOTT, J. M.

*Vineyards of France.*Hodder & Stoughton, London, 1950, 9½
× 7½ in., pp. 159, illus., 25s.

In the frenzied existence of today when speed has banished caution and uniform mediocrity or worse tends to displace occasional brilliance and humanity it is refreshing to come across a work of this calibre. By many it will be judged superficial, frothy, even a little precious, yet to vine growers and wine makers in far lands over the seas, where climate and soil are kind, we recommend it most strongly as a corrective to the facile modern idea that a chemical formula is the answer to everything and that excellence can always be produced by pressing the right button.

To the hospitable members of the Wine and Food Society at Renmark on the River Murray the lively sparkle of this book could be an inspiration in their efforts to cultivate a discerning palate in themselves and others. And the same holds good for all the other noble seekers after perfection who struggle to build up a tradition and taste for fine, not necessarily highly alcoholic, wine.

It is essentially a book of vineyards and cool cellars rather than of the laboratory. The authors journey through the vines of, Bordeaux to those of Burgundy and thence to the Rhone Valley and to Champagne, savouring not only wines but the atmosphere in which the famous vines of these regions grow and are coaxed to perfection. Their narrative of everyday facts glows with life, which is distilled into their pages. Advisedly I say "they", for a stirring text is more than nobly backed by lively coloured impressions of such busy but blissful spots as Haut-Brion, Meursault, Hermitage, Lafite and Hautvillers.

The hands of the clock may not be turned back, but an occasional visit, if only by the written word, to some of the oldest and still most renowned vineyards of the world cannot fail to mellow even the toughest, roughest, Kentish vinearion, who on the advice of Mr. Hyams and Mr. Barrington Brock is hoping too hastily to produce his vintage Yalding, or the New Australian, dreaming perhaps of Siena, but receiving his present inspiration from Nuriootpa or Rutherglen. Let them buy a copy and perpend their European heritage. D.A.

1371. DEUTSCHER INNEN- UND AUSSENHANDEL
-
- BERGBAU.

*Magnesium—ein Pflanzennährstoff. (Magnesium, a plant nutrient.)*Deutscher Innen- und Aussenhandel Bergbau, Berlin, W.8, 1952, 8½ × 6 in., pp. 216
+xiii plates, bibl. numerous.

The role of magnesium and magnesium manuring are discussed in 11 articles which do not aim at complete coverage of the subjects. Attention is drawn to Mg-containing potassium fertilizers as now produced in Germany.

1372. DUNCAN, R.

*Tobacco cultivation in England.*Falcon Press, London, 1951, 7½ × 5 in.,
pp. 141, bibl. 75, illus., 7s. 6d.

Tobacco has for long been a source of solace to innumerable people and of revenue to Chancellors of the Exchequer. Unfortunately, these two aspects are not wholly compatible, and, as the writer of this review knows only too well, the inveterate smoker's solace is somewhat marred by the magnitude of his contribution to the Exchequer. Mr. Duncan's view is that the individual with almost any patch of land that is reasonably sheltered could supply his own needs. After all, tobacco was once grown successfully in 40 counties in England and surplus production was exported to the Continent. The industry developed despite the opposition of non-smokers such as James I, who wrote anonymously a diatribe against the "stinking suffumigation", and Cromwell's soldiers who had instructions to trample all tobacco crops under foot. Later it had to compete with the claims of the colonial planters of Virginia, whose products were much easier to tax than those of the local farmer and thus received the backing of the Treasury. Tobacco growing was forbidden and eventually extinguished towards the end of the seventeenth century.

Mr. Duncan tells this story in entertaining fashion, quoting, in appendices that occupy nearly one-third of the book, various original manuscripts including that of James I "A counterblast to tobacco". He then turns to recent attempts to revive the industry and describes methods of cultivation and curing that he and others have evolved through the sometimes rather painful process of trial and error. He himself grows tobacco as a "root" crop in a farm rotation and finds that once the plants are established they grow like weeds. Curing, too, is simple provided the grower uses a thermometer and is not excessively timid. He is rather less precise about the preparation of the finished product, but facilities now exist whereby the amateur can have up to 25 lb. of leaf cured and manufactured without having a host of Excise and Revenue men camping out on his holding during harvest time.

For those who, like the reviewer, feel tempted to try growing tobacco, *strictly for home consumption*, it would perhaps be as well to remember that Mr. Duncan is a poet as well as an enthusiast and has undoubtedly exercised the poet's right to indulge in a bit of licence here and there. A statement that at least 70% of the 2,000,000 derelict acres in England could grow tobacco is assuredly an example of this. His recommendations, moreover, on cultivation and manuring appear to be based on rather slender evidence. Few fruit growers are likely to follow the advice to plant *Nicotiana rustica* to provide home-made nicotine washes; these have been largely replaced by newer insecticides and in any case are not used against winter moth. Again, a better fungicide than "chestnut compound" for treating seedlings is Cheshunt compound. But provided it is not taken too seriously the book can be recommended as light reading, even for non-smokers. The amateur may well be encouraged to try his hand, but must not necessarily expect to produce a smokeable article at the first attempt. The farmer who may be tempted to do so on a commercial scale is strongly advised to read the "Statutory Rules and Orders 1911" reproduced as Appendix A, even though these do not make light reading at all. G.K.A.

1373. EDLIN, H. L.

*British plants and their uses.*B. T. Batsford, London, 1951, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 152, 15s.

A review has been attempted of the whole range of useful plants, both wild and cultivated, that flourish today in Britain. The result is an unusually interesting and instructive book. The plan has been to group the plants according to their uses and to give a clear word picture of each plant and its manner of growth and cultivation, with details of past development and its present position in rural life. Some 450 species are accounted for, only timber trees being omitted. On these the author, a forester, has written elsewhere. Otherwise no plant of even the smallest economic value in the present or the past has been overlooked. It is surprising to what unexpected uses normally unconsidered vegetation can be put. The descriptions of the bygone uses and the ingenuity of man in adapting the most improbable material to serve his needs is an absorbing study fully developed here. To instance a few: The method of splitting specially grown straws into a number of flat segments for use in the manufacture of "boaters"; the use of bulrushes for caulking beer barrels, of the roots of sea-holly (*Eryngium*) for candied sweetmeats, of horsetails (*Equisetum*) for scouring milk pails or for burnishing knights in armour before battle! The treatment of wounds with mouldy hot-cross buns might indicate that the discovery of the properties of penicillin is not so recent after all. The chapter on peat mosses is rich in peat-cutting lore from Ireland, Scotland and those parts of England where it is still practised. The chapters on grasslands describe the management of the various types and record the particular properties and value of every grass likely to be encountered, no small number. The chapter on heathlands describes the general management of moorland as regards grazing and burning and incidentally gives 12 different uses to which heather can be put. A heather bed, properly made, and we are told how to do it, possesses the resiliency and comfort of a spring mattress—and costs less. The theme running through the book is that the British country scene of today is not just a passive background to the work of the countryman but that its form and most of its flora are directly dependent on his activities and even a brief cessation, as has been shown by experiment and observation, will in a very few years bring about drastic changes. Ecologists are advised to study the ploughman no less than the bee! The book is well illustrated from a variety of sources including Gerard's Herbal of 1633 and Anne Pratt's works, 1860. There are others more recent and the many photographs are admirable. G.StC.F.

1374. GALET, P.

Précis d'ampélographie pratique. (A short account of a practical method of classifying and describing grape varieties.)École nationale d'Agriculture, Montpellier, 1952, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 182, bibl. 19, illus., 750 fr. or 850 fr. post paid.

M. Galet, who is head of the Viticultural section of the École nationale d'Agriculture de Montpellier, has subjected the variety collection at that Station to a detailed study. In an introductory chapter he discusses briefly the origins of the names used for grape varieties, the

groups of species of *Vitis* and hybrids grown for fruit or as rootstocks, the existence of different clones within a variety and the existence of variety collections. Descriptive methods used in the past as a basis for classifying varieties are submitted to a short but critical examination and the phenotypic system that he has developed is then described in detail. The primary characters he uses for identification are the buds on the point of growing, the young and adult leaves and the shoot and tendrils. In particular the adult leaves at 8 to 11 nodes from the base of the shoot are compared as to form and variation, shape, size, form of sinus, pubescence, colour, leaf surface and marginal indentations. Unlike some older classifications flower and fruit characters are regarded merely as secondary means of identification.

The major part of the book consists of four chapters devoted to the description of about 100 individuals, comprising the main American species of *Vitis*, rootstock varieties, hybrids grown on their own roots (direct producers) and the main wine and table grape varieties. Each of these chapters opens with a taxonomic key and the descriptions of most varieties are accompanied by a diagram of an adult leaf. A final chapter consists of a series of tables providing information on the areas planted in France, Algeria, Morocco and Tunisia to different rootstocks and direct producers, the reactions of some rootstocks to soil conditions, the genetic composition of rootstocks and direct producers, the relative earliness and lateness in bud break and maturity of the principal hybrids and their degree of resistance to mildew. The book closes with variety and species indexes and a bibliography.

The practical advantage of a system of identification based on vegetative rather than flower or fruit characters does not need stressing. Mr. Galet is well aware of the tendency for vegetative characters to vary in different environments and has made allowance for some of the more variable characters such as leaf size by defining these within relatively wide limits. Use has also been made of material from sources other than Montpellier for checking more precisely defined characters. Only experience will show, however, if this system of classification can be applied directly to the thousands of vine varieties found in different parts of the world or may require modification in matters of detail. Whether or not it may ultimately be generally adopted, it is an interesting and valuable contribution to the subject and should be widely studied and tested.

G.K.A.

1375. HAARER, A. E.

*Jute substitute fibres.*Wheatland Journals, London, 1952, $9 \times 5\frac{1}{2}$ in., pp. 185, bibl. 156, illus., 30s.

As Sir E. John Russell points out in a foreword to this book, jute grows to perfection only in East Bengal and the output is insufficient for world requirements. In particular, in the present unsettled state of the world the need for alternative, more widely dispersed sources of comparable soft fibres is a matter of urgency. Mr. Haarer has here assembled the information available on the three most promising alternative crops, Binlipatam jute (*Hibiscus cannabinus*), Roselle (*H. sabdariffa*) and Aramina fibre (*Urena lobata*).

Since these three plants are normally grown as annuals and are therefore, strictly speaking, outside our compass,

we shall confine our remarks to certain general considerations.

A series of chapters is devoted to each of the three crops covering such aspects as botanical descriptions, distribution, the fibre, seeds and their uses, selection and breeding, climatic, cultural and spacing requirements, harvesting, retting and extraction. Each chapter is further sub-divided into a number of self-contained sections. In these days when the tempo of research and experiment is constantly rising, the need for thorough revision of a treatise on almost any crop may occur within a few years. On the whole Mr. Haarer's arrangement of his material should lend itself admirably to this purpose, although one would have preferred to see the isolated chapters on the diseases and pests of the three crops divided among them as an intrinsic aspect of cultural practices. The bibliography, too, might well be divided among the crops, even though this would involve a few cases of repetition.

Up-to-date and comprehensive books of this type devoted to one particular crop or, as in this case, to several related crops fill a very real need, and should be of assistance to the grower as well as to the student and research worker. It is to be hoped that Mr. Haarer will receive sufficient encouragement from the response to this book to try his hand at producing similar treatises on other fibre crops such as ramie and the hard fibres, sisal, henequen and Manila hemp. G.K.A.

1376. HILL, A. F.

Economic botany.

McGraw-Hill, New York and London, 2nd edition 1952, 9×6 in., pp. 560, bibls. 4 pp., illus., 59s. 6d. or \$7.00.

The first edition of this "textbook of useful plants and plant products" appeared in 1937, and aimed at providing the student, who had not yet started to specialize, and also the ordinary reader with an introduction to the vast subject of economic botany. The whole field is covered briefly in a series of chapters devoted to industrial plants and plant products such as fibres, forest products, tanning and dye materials, rubbers, gums, resins, essential oils, fatty oils, sugars and starches; drug plants used in medicine and to provide fumitories and masticatories; food plants including cereals, legumes, vegetables and fruits; and the food adjuncts such as spices and beverages. The various plants falling within each section are dealt with in the form of short, simply written notes giving brief descriptions of the plants, their distribution and economic importance and the method of preparing and using their products. Those plants which serve more than one purpose appear in two or more sections.

The second edition follows essentially the same lines as the first. The information has been brought up to date as far as possible and the chapter on rubber plants in particular has been altered. A limited amount of new or additional information has been given on antibiotics, such drugs as cortisone and certain minor tropical fruits.

To endeavour to cover the world's basic industry in a single volume is a formidable undertaking, and Dr. Hill himself emphasizes that he is only scratching the surface. The problem, especially among the more highly developed crops, is to decide what to omit rather than what to include. Some unevenness in treatment is

almost inevitable; thus with apples and with citrus it is clearly stated that trees are usually propagated by budding or grafting, but with pears and peaches the reader is left to guess the method of propagation; again one is told that the oil palm begins to bear when 5 or 6 years old, but similar information does not appear to be provided about the coconut. The desire to condense information also leads in some cases to the creation of false impressions; thus it is stated that sugar cane is usually cut when the flowers are beginning to fade, which implies that flowering is a regular and not merely an undesirable habit; similarly the statement that "cane knives are ordinarily used, for machines have rarely proved practicable", while correct in indicating that harvesting is usually done by hand, does not reveal the increasing and successful use being made of mechanical harvesters. Clearly, too, no one man can have an intimate personal knowledge of all the world's plants and some errors are inevitable; thus the leaves of the coconut palm are stated to be 6 to 12 ft. long, whereas they are usually much longer than this; similarly *Pimenta dioica*, which yields allspice, is described as a small tree and later as 20 to 30 ft. in height, whereas in its native environment it commonly forms a fairly large tree that may sometimes attain a height of about 60 ft.

Fortunately it should be possible in future editions to correct or remove defects such as those mentioned without increasing the length of the book or its general character and style. A much more important consideration is the extent to which Dr. Hill has succeeded in his primary object of introducing the subject in a manner which will arouse the interest of the student. It is difficult for the reviewer, who is also a critic, to assess this, but the general impression gained is that the simply written blend of the historical, descriptive and factual adopted should make the subject come to life more vividly than is common with most textbooks. The plants and products of America and Latin America receive slightly more thorough treatment than those of other parts of the world, but the differences are not so marked as to falsify the general picture. The book is well indexed, generously illustrated and well printed and contains a bibliography of the more important books written on crops and their products since 1936.

G.K.A.

1377. HILKENBÄUMER, F., AND OTHERS.

Pflanzung der Obstgehölze. (The planting of fruit trees.)

Neumann Verlag, Radebeul, Berlin, 1951, H.3, 6½×5 in., pp. 87, illus.

Technik der Schädlingsbekämpfung. (The technique of plant protection.)

Ibidem, 1950, H.6, pp. 88, illus.

Bestands- und Ertragssicherung im Obstbau durch Frostschadenverhütung. (Frost protection in orchards.)

Ibidem, 1951, H.7, pp. 88, illus.

The three very practical brochures conform in style to Heft 2 of this series which was briefly reviewed in *H.A.*, 21: 1161.

1378. LAUMONNIER, R.

Cultures maraîchères. (Market garden crops.)

J.-B. Baillière et fils, Paris, 1952, 10×6½ in., pp. 625, bibls. numerous, illus., 3,500 fr.

For the French market gardener, whether he works an intensive smallholding or a large scale vegetable farm, this manual will provide the information on modern methods and equipment which he will need to take his place successfully in an increasingly competitive industry. M. Laumonier does not underestimate the exacting requirements of present day markets and the need for specialization. In this book he has combined the fruits of his own long practical experience with the results of such foreign research as could profitably be applied to French conditions.

In layout the book follows the traditional, well-proven lines. About one-third is devoted to the general principles of market gardening. An interesting survey of the economic importance of the industry in France is followed by chapters on factors to be considered when starting a market garden, manuring, soil cultivations, seeds and planting material (a subject on which the author is particularly well qualified to write by reason of his extensive work on seed production and selection), plant raising (including types of frames and methods of heating), planting, rotation of crops, irrigation, the principles of pest and disease control, harvesting, packing and marketing, and storage and refrigerated transport. The grower will find helpful guidance on the use of modern techniques such as subsoiling by explosives and electrical soil heating, while the forceful plea for an improvement of French marketing methods and standardization of produce points the way to more secure economic prospects.

The remaining two-thirds of the book deals with the culture of individual market garden crops, grouped under the headings leaf vegetables, root vegetables, tubers (early and second early potatoes), fruit vegetables (tomatoes, cucumbers and related plants, and, rather surprisingly, strawberries), bulbous vegetables, perennials (globe artichokes and asparagus), and legumes. The crops are dealt with at some length, each according to its importance, and, apart from details of cultural practices, information is given on varieties, storage and packing. For each crop a table is given of the most important pests and diseases, briefly indicating control measures.

French market gardening has developed along very specialized lines, a fact which will naturally limit the value of this book in some respects to the confines of *le beau pays*. English growers would not profit much, for example, from information on the use of hot beds and bell cloches, and would search in vain for guidance on the management of Dutch lights. They might even be misled into producing a fine crop of blanched dandelion leaves for Covent Garden market. But for the public for whom it is intended, *Cultures maraîchères* should ably supply a need created by a rapidly developing industry.

P.R.-D.

1379. McCLEAN, R. C., AND IVIMEY-COOK, W. R.

Textbook of practical botany.

Longmans, Green & Co., London, New York, Toronto, 1952, 10×6 in., pp. 476, illus., 36s.

Most books on practical botany deal with particular aspects of the science, such as plant anatomy, plant chemistry or field ecology. These, however, are too detailed for the young botanist who requires more general training before attempting to acquire specialized

knowledge. Written primarily for students working for a university degree, this book does not give details to be found in the more specialized treatises, but covers in outline the whole field of modern botanical knowledge. It is a laboratory manual intended to be complementary to the authors' *Textbook of Theoretical Botany* (which is to appear in four volumes) and describes practical studies illustrative of the main branches of the subject discussed in the theoretical book.

After a summary of the classification of plants, instructions are given, with examples, on general methods, cytology, evolutionary morphology, morphology and histology of angiosperms, sexual reproduction of angiosperms, classification, plant physiology, modification of the normal plant form, ecology, variation and heredity. An appendix gives directions for preparing and using the microscopical stains and chemical reagents and also reference tables; this is followed by tables of four-figure logarithms and antilogarithms and indexes.

As a "laboratory" handbook, most of the material mentioned is such as would be available in a university collection itself or in a botanic garden. In the section on Plant Ecology, however, survey work is mentioned and the student is advised to use a "flora" for the identification of the plants he finds, and a notebook for recording field observations.

A section useful to the modern botanist is that on Variation and Heredity, in which hybridization and inheritance are introduced, outlining experimental hybrids, natural hybrids, variation and hybridization within natural species, and graft hybrids. Bud sports, though hardly adaptable for practical demonstration, might have been mentioned in passing and perhaps illustrated pictorially or with specimens, such as the red-fruited bud sports in some apple varieties. The horticultural student will find certain parts of particular interest, e.g. those dealing with morphology and histology of angiosperms and, of course, variation and heredity.

The book presents, clearly and with many photographic illustrations, suitable material and methods for practical study, and it can be recommended for the use of lecturers and students in botanical and horticultural departments of colleges and universities. H.W.

1380. MACSELF, A. J.

Ferns for garden and greenhouse.

Collingridge, London, 1952, 9×6 in., pp. 254, 21s.

A practical, readable and beautifully illustrated handbook on ferns and fern growing. Ferns have always occupied the lower rungs of the popularity ladder. The author, an acknowledged expert, and so possibly biased, considers their place is nearer the top and the avowed purpose of his book is to put them there. If a skilful and enthusiastic presentation of the case in favour, coupled with an exposition of cultural methods, which, while omitting nothing relevant, contrives to make it all sound almost too easy, if these count for anything then the attenuated ranks of pteridology should soon be swelling with an influx of eager recruits. Hardy rather than the more tender ferns will prove the most adequate for present day needs, since they can be grown in the open or in room or greenhouse with equal ease. Their genera and species may be few, but these species are prolific of a great diversity of beautiful

forms which can be obtained by name so that there need be no fear of monotony. Although the emphasis is on hardy ferns the more tender sorts are not ignored, and those who have the facilities to grow them will be well repaid by a study of the chapters in which they are discussed. As it happens some of these indoor sorts will tolerate considerable discomfort and even neglect. Not that the author would approve of anything of the sort, he is all for constant supervision, but he does discourage the over anxiety for a plant's welfare which expresses itself in constant re-potting. A fern which is doing well in a small pot should be left in it undisturbed and if it is ailing re-potting is just as likely to aggravate the trouble as to remedy it. Description and cultural notes are given for a large number of varieties. In addition to cultural routine for outdoor plants chapters are devoted to growing ferns in cold and warm greenhouses, hothouses, Wardian cases and rooms. The Selaginellas have a chapter also. Propagation by all methods is fully discussed, as is the treatment of pests and diseases. Nurserymen who specialize in ferns are practically non-existent with the result that all the finest varieties are in the hands of amateurs. The novice must go to a nurseryman for the nucleus of his collection. For this reason the author pleads with amateurs who have a stock of choice varieties to let part of it pass into the hands of a trade expert who is anxious to become a fern specialist and thus help to stimulate a cult which can give life-long pleasure to its devotees. Nomenclature in ferns tends to aggregations of epithets somewhat daunting to a novice. It is shown how this is inevitable and that even if a variety should be christened *Polystichum angulare plumosum densum superbum* there is no real cause for alarm. The words all mean something and are not only descriptive of the plant's habit but indicate, so to speak, the previous incarnations leading to its present, though possibly still not final, state. Up and coming pteridologists will find this book invaluable and the established connoisseur will be unwise to ignore it. G.StC.F.

1381. SCHAER, E.

Pflaumen- und Zwetschgensorten der Schweiz.
(Plum and zwetschen varieties in Switzerland.)

Verbandsdruckerei AG., Bern, 1952, 8 × 6 in., pp. 80, bibl. 11, illus., Swiss fr. 4.70.

Swiss plum and zwetschen varieties are here described by an expert from Wädenswil. The reader may be surprised to learn how widely these fruits are grown in Switzerland—in 1951 over 2½ million trees were counted—and especially how popular zwetschen are. The explanation is that "Zwetschgengkuchen" (a large open tart) is extraordinarily popular in Switzerland and that a considerable part of the zwetschen crop is dried or processed for spirit. From the countless varieties planted fifty have been selected for study (thirty-seven in detail), but of these only eleven are of real economic importance. The descriptions follow the concise pattern successfully adopted by Kessler for apples and pears in two earlier volumes of the series [see *H.A.*, 16: 1200 and 20: 464], but with the difference that here the greatest emphasis is laid on the characters of the stone by which plum varieties are best identified. In each case economic importance and utilization are noted and merits are judged. To keep the price down and to ensure

a wide circulation of the book the stiff cover and the colour plates have had to be sacrificed. With plums, however, colour shades are not of the same importance as with apples and pears. What matters most is a clear characterization of fruit shape and stone, and that has been achieved in the reproductions from first-rate photographs. V.H.G.

1382. SHAW, B. T. (Editor).

Soil physical conditions and plant growth.
Agronomy II.

Academic Press Inc., N.Y., 1952, 9 × 8 in., pp. 491, bibl. extensive, illus., \$8.80.

Those soil and plant scientists who find it impossible to keep abreast of published literature on the relation of soil physical conditions to plant growth will find in this recently published monograph a most critical and comprehensive study of the subject. It is a full review of present knowledge amplified by the opinions of indisputable authorities on the edaphic factors considered. The work is divided into five chapters. The first, a background to the others, on the Soil as a Physical System, is written by L. T. Alexander and H. E. Middleton, whilst the remaining four deal separately with four fundamental soil factors in relation to plant growth. These are, Soil Water by L. A. Richards and C. H. Wadleigh; Soil Air by M. B. Russell; Soil Temperature by S. J. Richards, R. M. Hagan and T. M. McCalla; and Mechanical Impedance by J. F. Lutz.

This arrangement is handled excellently and the separation of these factors enables the reader to assess the state of knowledge and understanding of their individual effects on plant growth. But, as pointed out frequently in the monograph, this division also serves to emphasize the interdependence of the factors in their effects on plant growth. The significance of those effects is dealt with separately in each chapter.

The discussion on the effects of the factors in relation to plant growth covers, very suitably, a wide variety of crops and concerns directly the soil scientist and plant physiologist in horticultural and agricultural research. It is an excellent work of 491 pages for which the Joint Committee on Soil Tilth established by the American Society of Agronomy and American Society of Agricultural Engineers, who initiated its production, as well as the authors, should be commended. J.E.G.

1383. SHAWARBI, M. Y.

Soil chemistry.

Chapman & Hall Ltd., London, 1952, 9 × 5½ in., pp. 420, bibl. numerous, 32s.

Soil investigation proceeds along three general lines considered as chemical, physical and biological, which are interdependent but for convenience of study are so separated. It must be conceded that no book can be confined entirely to one aspect of soil work without impinging upon all other aspects concerned in the field of soil science.

This textbook, purporting to be confined to soil chemistry according to the title and the author's preface, incorporates far more than its name would suggest. In fact its contents, with more emphasis on, and amplification of, the chemistry of soils, and with a correspondingly diminished stress on the physics of soils, cover practically as wide a field as the revised edition

of Sir Danial Hall's classic *The Soil*. The author deals with the origin and formation of soils, soil classification, mapping, and productivity ratings, whilst three chapters are concerned with the development and characteristics of the major soil groups of the world. The chapters on Biochemical processes in soils, Ionic exchange in soils, Minor elements of the soil, The soluble matter in soils and soil solution and Soil acidity and lime practice have much in them to commend, for they are explicit and intelligible and offer a general account of the present conceptions of these soil topics to the non-technical reader.

Chemical analysis of the soil is not dealt with except by mention of its significance and by an account of the various techniques, without a description of actual methods, for assessing soil fertilizer requirements.

The author departs from normal custom in not giving references in the text to publications on which certain statements are based and from which subject matter is taken. Workers' names, excluded from the index, are frequently mentioned without initials, and this increases the difficulty of tracing the original papers. Readers, moreover, are bound to get that "We've been here before" feeling on not a few occasions despite the absence of "quotes" or reference to other authorities. The author has in fact quoted at some length from other authorities, as is acknowledged in an apology slip opposite the title page. Due acknowledgement in the text would have been more generous.

The bibliography itself covers work from 1930 inclusive, and is a very useful selection of papers covering, section by section, all aspects of soil studies. J.E.G.

1384. THOMAS, M.

Back crossing: the theory and practice of the backcross method in the breeding of some non-cereal crops.

Tech. Commun. Bur. Plant Breed. Cambridge 16, 1952, 8½ × 5½ in., pp. 136, bibls. extensive, 15s.

This little book explains the theory of back-crossing and its uses in plant breeding, dealing in detail with the results obtained by the use of the method in cotton, tobacco, tomato and potato breeding. Although its chief appeal will be to the specialist plant breeder, it contains much that will interest the general horticulturist, who cannot fail to be impressed by the very great precision being achieved by the modern plant breeder in the manipulation of the genes, particularly in the shorter lived plants. H.M.T.

1385. TRUOG, E. (Editor).

Mineral nutrition of plants.

University of Wisconsin Press, 1951, 9½ × 6½ in., pp. 469, bibls. numerous, illus., \$6.

The mineral nutrition of plants has attracted increasing attention in the past few years so that our information and understanding have advanced considerably. The time is ripe for the appearance of a comprehensive and clear monograph which would serve as a reference book for investigators in this field, hence the book under review, with contributions from a distinguished panel of experts, is sure to be received with interest.

There are eighteen chapters, which were originally contributions to a symposium held at Wisconsin University in 1949. The styles of presentation vary from annotated guides to the literature (there are 796 refer-

ences cited) to clear authoritative expositions. The papers were intended to follow a logical sequence starting with the soil as the natural source of mineral nutrients, and proceeding to consider the mechanism of entry and translocation of minerals in plants, their role in nutrition and, finally, the influence of various environmental factors. A compilation of papers, such as this, in which no attempt is made to weld the discrete parts into a balanced satisfactory whole, is bound to produce an uneven result. Thus there is considerable repetition and overlapping on the one hand, and serious gaps on the other. For example, when Lundegårdh's theory of ion accumulation is treated in detail by H. Burström, there is no occasion to have it outlined again twice by other authors. Three omissions come to mind. Space should have been found for a discussion of methods used for diagnosing and curing mineral deficiency troubles, and for a chapter on the role of mycorrhizae, nodule bacteria and other symbiotic associations in assisting absorption of elements by the plant. The lack of an index in a publication of this nature detracts seriously from its value.

However, in spite of these criticisms it must be admitted that a great deal of information, though not all of it entirely relevant to the subject, is brought to the attention of the reader, who is made to appreciate the great variety of factors which influence the nutrition of plants. On this account the book deserves to be read by research workers, advisory officers and others concerned with increasing the productivity of land.

The book, which is well printed and bound and liberally illustrated with diagrams and photographs, and is a stimulating review of many aspects of the mineral nutrition of plants, cannot, however, be regarded as, and probably was not intended to be, an up-to-date reference book. A.C.M.

1386. ULRICH, R.

La vie des fruits. (The life history of fruits.)

Masson et Cie, Paris, 1952, 9 × 6½ in., pp. 370, bibl. pp. 40, illus., 2,000 fr.

During the last 50 years a vast mass of information has been accumulated on the structure, physiological processes and composition of fruits. In *La Vie des Fruits* an attempt is made to bring together and integrate this scattered information in the space of one volume. It is an ambitious undertaking, but M. Ulrich, Director of the Biological Laboratory of the Station du Froid (C.N.R.S.) is to be congratulated on the masterly and discerning way in which he has handled his material. As he states in the preface, this is not a monograph on the edible fruits, species by species. It is rather an exposition of the life processes of a fruit, the general principles being amplified by reference to the behaviour of particular fruits.

The field is systematically covered. A brief introduction on the structure of the flower is followed by an analysis of the factors leading to fruit set or parthenocarpic development. Then comes a classification of the main stages in the life of a fruit, the morphological and cytological changes that take place during growth and the conditions affecting growth. The next 2 sections deal with the form and structure of ripe fruits and the composition of ripe fruits. Following on from this is a detailed technical account of the various gaseous exchange processes, a subject on which the author has

done considerable research, and the transformation of chemical substances within a fruit during development. Finally come 3 short sections which contain much of practical interest to the grower: one on maturation and maturity dealing with maturity tests, factors affecting ripening and disorders of ripening, one on senescence, dehiscence and fruit fall, including control of fruit fall by growth substances, and one by M. Viennet Bourgin, Professor at the Institut Agronomique, on fungus diseases.

Although the scope of the book is so wide, the treatment is rarely superficial. By covering the processes of development step by step and defining each technical term as it arises, the author has managed to deal with even complex biochemical reactions in a way that is comprehensible to the non-specialist. Much of the general information is supplemented by detailed experimental results and graphs, but where the limitations of space have made this impossible, as notably in the chapter on factors affecting growth, the student can be guided by the admirable bibliography. Although this does not claim to be comprehensive, it contains over 1,000 references and is arranged according to the subject matter of the various chapters. Indeed, it is probably as a collation of the literature that this book will be of most value to the research worker. The line drawings, largely taken from other sources, are well chosen and helpful.

P.R.D.

1387. WALKER, J. C.

Diseases of vegetable crops.

McGraw Hill, New York, 1952, 9×6 in., pp. 528, illus., bibls. numerous, \$7.50 or 64s.

This textbook on vegetable diseases by Professor J. C. Walker of the Department of Plant Pathology, University of Wisconsin, covers a wide range of diseases of each of the following crops: asparagus, bean, beet, carrot, parsnip, celery, parsley, brassicae, cucurbits, lettuce, onion, leek, shallot, pea, pepper, potato, rhubarb, spinach, sweet potato and tomato.

Each disease is dealt with under the headings: symptoms, the causal organism, disease cycle and control, with, in some instances, an additional section on varietal resistance. In the case of most of the vegetables, there is a comprehensive section on non-parasitic diseases. The number of diseases involved precludes any very extensive consideration of each, but, as would be expected from one who has done eminent work in this field, the treatment is concise and admirable both from the technical and practical points of view and is especially interesting when it deals with environmental aspects and disease resistance. Some space is allowed to several vegetable diseases not yet recorded from the United States. Appropriate references are given for each disease. These are mostly to American publications, though some of the more important English and other papers are also listed.

The author states in his preface that it is difficult to make a technical manual of this sort entirely satisfactory to all potential users. There is no doubt, however, that his manual will prove of great value to all plant pathologists (students, research workers, or advisers), horticulturists and up-to-date growers interested in vegetables. The format and illustrations are of the fine quality we associate with the McGraw Hill publications. L.O.

1388. WARDLAW, C. W.

Morphogenesis in plants.

Methuen & Co. Ltd., London, 1952, 6½×4 in., pp. 176, bibl. extensive, illus., 10s. 6d.

Professor Wardlaw is to be congratulated on a presentation as attractive as his title is bold. His book can be recommended both to the student and to the research worker as a readable and stimulating review of our progress towards an understanding of growth and form in plants.

This small book is timely. The discussion on the training of botanists at the Belfast Meeting of the British Association, since developed in the columns of *Nature*, has focused attention on the growing need to relate the diverging branches of botanical science through the elucidation of the basic problems relating to the organization and growth of the plant. Here are brought together brief accounts of the main approaches that have been made to the problems of morphogenesis from the standpoints of embryology, histology, developmental anatomy, phyllotaxy, physiology, biochemistry and genetics. An understanding of the developmental processes finding expression in the distinctive morphology of particular species and of the factors controlling them, both internal and external, is seen as one of the major requirements of botanical science and as the key to the relationship of its constituent studies. From such viewpoint may yet arise a wider realization of the advantages that must accrue to botanical science in general by the modern concentration of research upon species of major economic importance—always provided that sufficient scope is given to the “fundamental” approach. As a contribution towards such an understanding, the author has attempted to illustrate, by means of selected examples, progress so far achieved and to indicate the scope for further studies. The specialist may regret the brevity with which his interests are treated; the more general reader is, however, given a reasonably comprehensive introduction to the field as a whole. It is regrettable that there are so few references to publications later than 1949—thus F. J. Richards's recent paper (*Phil. Trans. Ser. B*, 1951, 235: 509-64) on phyllotaxy is not dealt with, nor is the account of recent developments in the study of growth promoting substances altogether adequate, but for these small blemishes presumably publishing difficulties and not the author are responsible.

F.R.T.

Annuals and reports.

(See also 1224, 1306, 1320, 1348, 1349, 1351.)

1389. F.A.O.

Yearbook of Food and Agricultural Statistics, 1951. Vol. 5, Part I. Production. [English, French and Spanish], 1952, pp. 298, \$3.50 [17s. 6d.].

This yearbook follows the same lines as before [see *H.A.*, 21: 2156] but the coverage has been increased by including new information for certain countries whose statistical services are being developed. A compilation of copra production is included for the first time. In the section on Food Supply graphs are shown depicting the availability and distribution of calories and proteins in the various countries for both the pre-war and post-war periods.

1390. THE FRUIT-GROWER.

The Fruit-Grower Year Book 1952/53.
Benn Bros., Fleet St., London, pp. 159,
10s. 6d.

This useful reference book, giving concise information on subjects such as marketing, varieties, fertilizers, plant protection products, advisory services and horticultural literature, follows much the same lines as before. May it be suggested that dates of publication would increase the value of the Horticultural Bibliography?

1391. HELLYER, A. G. L. [Editor].

The Amateur Gardening Diary and Horticultural Directory 1953.
Collingridge Ltd., London, 1952, 7½ × 5 in.,
pp. 160, 8s. 3d.

One hundred pages of this are merely a blank gardener's diary with footnotes of seasonal work for the gardener. The remaining sixty are packed full of information on the addresses of horticultural societies and research stations, colleges, information services, N.A.A.S. and others, which one occasionally wants but never seems to have at hand. Useful sketch maps are included. While realizing the difficulty of providing red hot information on all points we hope to see more accurate locations for N.A.A.S. stations and a clearer note of the Scottish Institute of Horticulture given in the 1954 edition.

1392. ROYAL HORTICULTURAL SOCIETY.

The Fruit Year Book 1953, No. 6.
R.H.S., Vincent Square, London, 1952,
9 × 6 in., pp. 137, illus., 15s.

The 1953 yearbook is fascinating to the amateur, interesting to the professional and useful to the horticultural investigator. Most of its 19 short articles are abstracted separately.

1393. BALSGÅRD (GRANHALL, I.).

Föreningen för Växtförädling av Fruktträd. Verksamhetsåret 1951. (Annual Report of the Society for Fruit Tree Breeding, Balsgård, for 1951), 1952, pp. 16.

Pome and stone fruit and hazel crosses on a large scale; selection work on seedlings from earlier crosses; testing for cold resistance; the induction of mutations by radio-active isotopes.

1394. CAMPDEN.

Annual Report of the Fruit and Vegetable Preservation Research Station, Campden 1951, 1952, pp. 19.

Canning and quick-freezing variety trials. Maturity of peas. Tainting of carrots by sprays. Texture of processed peas.

1395. CANADA.

Report of the Minister of Agriculture for Canada for the year ended March 31, 1951, 1951, pp. 102, 50 cents.

Science service: tobacco, vegetables, tree fruits, small fruits, ornamentals, plant physiology, weeds, seed-borne diseases, fungicides, insecticides, miscellaneous insects and nematodes, microbiology, bee diseases. *Experimental Farms Service*: apiculture, horticulture (new varieties of apple, tomato and cabbage, disease control, floriculture, apple syrup and juice, apple storage), weed control, tobacco. [See also separate abstracts.]

1396. CENTRALE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK.

Verslag over 1951 van het Instituut voor Toegepast Biologisch Onderzoek in de Natuur, Oosterbeek. (A.R. of the Institute for Applied Biological Research in Natural Science, Oosterbeek, for 1951), 1952, pp. 50, being Meded. Inst. toegep. biol. Onderz. 13.

Compost fauna; methods for studying the relationship between soil fauna and fungi; the ecology of free-living nematodes; windbreak studies; chromosome counts and biological observations on a blackberry collection; breeding scab-resistant apple varieties; chromosome counts and breeding of *Amelanchier* spp.

1397. CEYLON (JOACHIM, A. W. R.).

Administration Report of the Director of Agriculture for 1951, Part IV—Education, Science and Art (C), 1952, pp. 189, Rs. 3.80.

Tea Research Institute: dusting and hand plucking as a means of controlling blister blight, fish leaf plucking and spraying experiments, propagation by cuttings, green manures, control of grass weeds with TCA, pruning cycle increment and weeding experiments, minor elements, Guatemala grass as a fertility builder. *Rubber Research Institute*: technical classification of smoked sheet, manurial trials, major and minor element deficiencies, poisoning methods with sodium arsenite, promising new clones, effect of rain-guards on yield, rubber leaf mildew. *Coconut Research Institute*: trials of artificially pollinated and crossed seedlings, yield trials, manurial and placement trials, treatment of tapering palms, minor and trace elements, effect of salt, dwarf palms as a source of toddy. *Botany*: vegetable seed dormancy and viability studies. *Sugar cane*: variety, fertilizer, time of planting, spacing and irrigation trials. *Chemistry*: cacao sickle leaf disease, deficiency chlorosis in citrus. *Entomology*: breeding of eulophid parasite (*Trichospilus pupivora*) to control coconut caterpillar (*Nephantis serinopa*), cucurbit fruit fly control trials. *Horticulture*: indigenous lime improvement, cacao vegetative propagation, citrus seed viability tests, pineapple flower induction. *Tobacco*: minor element and variety trials.

1398. C.P.V. EXPERIMENT STATION, INDONESIA.

Verslag over 1950 van het proefstation der C.P.V. (Report of the C.P.V. Experiment Station, Indonesia, for 1950), 1951, pp. 103 [received Oct. 1952].

Agricultural Department of W. Java and S. and W. Sumatra. Rubber: breeding and selection, trials on rootstocks, manuring and tapping systems. *Tea*: trials on manuring, shading, plucking and pruning. *Cacao*: trials on manuring and soil pH.

Agricultural Department of C. and E. Java. Rubber: testing of clones and seedlings, spacing trials. *Coffee*: breeding and selection, eelworm investigations. *Tobacco*: breeding and selection, studies on diseases and drying techniques.

Central Botanical Department. *Coffee*: a variety collection was started. Chromosome doubling of hybrids. *Tea*: selection work, vegetative propagation studies, control of *Heterodera marioni*, cockchafer grubs, helopeltis. *Cacao*: selection work, pollination and incompatibility studies. *Tobacco*: trials of X-ray mutants and colchicine-treated seed.

Central Chemical and Technical Department. Chemical analyses and processing problems.

1399. CYPRUS (CHAMBERS, P. C.).
Annual Report, Department of Agriculture, Cyprus, 1951, Nicosia, 1952, pp. 16, 28.
Entomological: control of *Phyllocoptes oleivorus*, *Aphis gossypii* and *Ceratitidis capitata*. *Chemical*: citrus and vine leaf analyses. *Weedkiller*: sodium trichloracetate.

1400. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Report of the Department of Agriculture for Scotland for 1951, 1952, pp. 103, illus., 3s. 6d.

Two short paragraphs refer (1) to the setting up of a horticultural research institute at Mylnesfield Farm, Invergowrie, Perthshire, and (2) to the transfer to the Institute of the Scottish raspberry investigation unit at Dundee and the Department of Agriculture's strawberry disease investigation unit at Auchincruive.

1401. D.S.I.R., LONDON.
Food Investigation 1951, being *Report of the Food Investigation Board with the Report of the Director of Food Investigation for the year 1951*.
 H.M. Stationery Office, London, 1952, pp. 39, bibl. 93, 1s. 6d.

Notes are contained on the following: *Biochemistry*: the volatile compounds produced by apples, the chemical composition of apple skins, the organic acids, amino acids and polysaccharides of apple fruits. *Storage of apples and pears*: English dessert apples, volatile products from fruit, respiration studies, injury from carbon dioxide and low temperatures. *Pre-storage treatment of fruits*: skin coatings. *Vegetable storage*: wastage during distribution, celery, leeks. *Rotting of fruit and vegetables*: apples. *Other research*: respiration of organs and rate of living, plant acids, plant cell wall fractions, metabolism of green peas, estimation of ascorbic and dehydro-ascorbic acid, phenolic constituents and enzymic browning, carotenoid studies.

1402. D.S.I.R., N.Z.
26th Annual Report of the Department of Scientific and Industrial Research, New Zealand, for 1951-52, Wellington, 1952, pp. 84, 1s. 9d.

The report includes: *Botany Division*: Yellow-leaf virus disease of *Phormium tenax* transmitted by *Oliarius atkinsoni* [see also *H.A.*, 22: 1710]. *Fruit Research Station*: 10-year-old lemon rootstock trial, steam treatment of soil for replanting apples, a certification scheme for plant hormones, control of pre-harvest drop in sweet oranges with 2,4-D, wound dressings. *Plant Disease Division*: Low-temperature treatment against fruit fly in oranges, russetting of lemons probably caused by thrips, black root-rot and red-core root rot of strawberries, tomato canker control with Phygon XL, tobacco-necrosis virus in lettuce, insecticide and fungicide studies. *Hop Research*: Virus in imported cuttings of Wye varieties, a defoliation of plants associated with low soil pH, black root-rot investigations, chemical investigations of hop material, especially B, Mg and N status. *Tobacco Research*: Methyl bromide and steam

for weed control, improved texture and quality of leaf due to B, maleic hydrazide and mineral oil to control growth of laterals, breeding for resistance to root-rot, mosaic and verticillium wilt. *Cawthron Institute*: Some of the tobacco and hop research was carried out at the Institute. Notes are given on Mg and B deficiencies in hops, B, Mg, Cu and Zn deficiencies in fruits, dry matter distribution in hop plants and tomato investigations.

1403. DOMINICA.
Annual Report of the Department of Agriculture, Dominica, for 1949, Castries, St. Lucia, pp. 33 [received 1952].
Sugar cane: variety trials. *Vanilla*: fertilizer experiments. *Tomatoes*: variety trials.

1404. FLORIDA.
Annual Report of Florida Agricultural Experiment Stations for year ending June 30, 1951, pp. 277, illus.

Work in progress reported from the 12 departments, 4 field laboratories and 10 branch stations includes: *Entomology*: Control of pecan, woody ornamental and flue-cured tobacco insects, mulches on spinach attacked by nematodes. *Horticulture*: Testing of shrubs and ornamentals and methods of propagation, effects of B on pecans, cultural requirements of mu-oil tree (*Aleurites montana*), variety and irrigation trials with vegetables, quality of vegetables as related to fertilizers used, vegetable packing, vegetable breeding. *U.S. Field Laboratory for Tung Investigation*: Determinations of oil contents, studies on the characteristics of the oils of 5 *Aleurites* spp., variety trials, cold resistance and fertilizer trials, studies on tung leaf enzymes. *Plant Pathology*: Damping off of vegetable seedlings, phomopsis of eggplant, camellia diseases, virus diseases of vegetables including cucurbits, control of scab and other foliage diseases of pecan, causes and control of diseases of potted plants. *Strawberry Investigations Laboratory*: Variety, fertilizer and nematode control trials. *Watermelon and Grape Investigations Laboratory*: Control of watermelon and grape diseases, weed control, sesame studies. *Federal-State Frost Warning Service*: Up-to-date frost warning for citrus and vegetable growers, testing of frost protective methods. *Central Florida Station*: Damping off and root rots of vegetables, cercospora blight of celery, vegetable breeding and variety trials, soil management in field vegetables, pest and disease control in vegetables. *Citrus Station*: Melanose and stem-end rot, nutrition, combined control of scale insects and mites, water relations of citrus, the nature and control of citrus decline, parasitism of citrus mites and diseases of insects, handling of fresh fruit, chemistry of insecticides, horticultural machinery, ecological research on citrus production, citrus processing and by-products [see also separate abstracts under *Citrus*]. *Everglades Station*: Fruit tree trials, ecological studies on *Tortrix ivana* attacking celery, control of thrips on beans, control of sugar cane moth borer, cane breeding trials, vegetable variety trials and breeding. *Gulf Coast Station*: Vegetable variety trials, breeding disease- and insect-resistant tomatoes, nutritional disorders in vegetables, chemicals for disease and pest control on vegetables, gladiolus variety trials and pest and disease control, control of nematodes attacking vegetables, mulching vegetables

with aluminium foil, weed control in vegetables and gladioli. *North Florida Station*: Disease-resistant tobacco varieties, management of cigar-wrapper tobacco plant beds. *Subtropical Station*: Citrus and avocado cultural studies; notes on sapodilla, macadamia nuts, Mysore raspberry (*R. albensens*), naranjilla (*Solanum quitoense*), bamboo, annona, litchi and papaya; tomato diseases, sclerotinose of vegetables, diseases of Tahiti lime; and guava propagation, culture and breeding.

1405. GOLD COAST COLONY.

Report of the Department of Agriculture, Gold Coast Colony, for the year 1950-51, 1952, Accra, pp. 29, 28. 6d.

Cacao: swollen shoot disease control, capsid control with a locally formulated DDT preparation, research into control of the mealy-bug vector of swollen shoot disease by the systemic insecticide Hanane (C.R.409). *Other crops*: citrus, coffee, coconut, oil palm, fibres, pineapples, sugar cane, tobacco. *Entomology*: studies on the parasites of citrus fruit-piercing moths. *Pathology*: lime die-back, Cape St. Paul wilt of coconut.

1406. I.R.H.O.

Rapport annuel 1951. Institut de Recherches pour les Huiles et Oléagineux. (Annual Report of the Institute for Research on Oils and Oil Plants 1951), Paris, 1952, pp. 83, illus.

Laboratory research: carotene and glycerides from palm oil, diacids from castor oil for fibre manufacture, paper and boards from palm waste, foliar diagnosis. *Field research on oil palms*: biology—root systems, anatomy and cytology of buds, mineral nutrition; fertilizer experiments—effect and comparison of fertilizers, placement; cultural experiments—thinning and maintenance, soil cover, mechanization, influence of forest regrowth and mulching, opening-up with and without burning, disposal of cleared material. *Field research on coconut palms*: organic and mineral fertilizers and placement, mineral nutrition, selection.

1407. KENTUCKY.

Results of Research in 1950, being 63rd Annual Report Kentucky Agricultural Experiment Station, 1950, 1951, pp. 72 [received 1952].

Tobacco: cultural practices, marketing, manuring, pest and disease control, breeding. *Strawberries*: economics of production, pest control, variety tests, cold storage of plants. *Tomatoes*: variety trials, foliage sprays with urea and sucrose. *Beans*: herbicides, rust-resistant varieties, Mexican beetle control. *Cucurbits*: control of squash bug and cucumber pests. *Apples*: variety and cover crop tests. *Peaches*: variety tests, peach tree borer control. *Grapes*: varieties resistant to black rot.

1408. KENYA.

Annual Report of Kenya Department of Agriculture for 1950, Vol. II, 1952, pp. 186, sh. 7/50.

Entomology: control of pests of coconut, pineapple, sisal, banana, coffee, tea, apple and other crops. *Pathology*: control of pyrethrum bud disease (*Ramularia bellunensis*). *Chemistry*: manurial trials, analysis

of, and depreciation and storage losses in, pyrethrum, herbicide tests. *Plant breeding*: sunflower. *Coffee agronomy*: trials of Cu sprays, pruning, shade trees, fermentation and varieties. *Coffee pathology and physiology*: observations on leaf shedding, yellow spotting, bark and leaf maturation, the effect of Cu spraying at different seasons on leaf shedding, growth control by maleic hydrazide. *Coffee chemistry*: trials on cultivation, boma manure, fertilizers, mulching and soil regeneration, soil structure measurements of cultivation effects. *Horticulture*: apple rootstocks, topworking apple and citrus, fruit drying, control of prolonged dormancy by oil sprays, nutrition, soft fruit and vegetable trials, pineapple propagation. *Pyrethrum*: breeding, bud disease (spraying and weeding trials, resistant clones), stripping, rotation and spacing trials. *Sisal*: trials on cutting, spacing, planting method and material, and nursery practice.

1409. LEEWARD ISLANDS.

Annual Report of the Department of Agriculture and Veterinary Services, Leeward Islands, for 1950, 1952, pp. 94.

Antigua. Sugar cane—variety, time of planting, manurial and catch crop trials. *Tomato*—manurial, spacing and staking trials. *Onion*—manurial and varietal trials. *St. Kitts—Nevis—Anguilla*. Sugar cane—variety, spacing and manurial trials.

1410. MADRAS DEPARTMENT OF AGRICULTURE.

Administration Reports of Subordinate Officers of the Department of Agriculture, Madras for 1949-50, 1951, pp. 782.

Coimbatore. Oil seeds specialist: castor and coconut research. Fruit specialist: mango, citrus, banana, apple, plum, pear, peach, persimmon, mangosteen, melon. Chemist: composts, foliar diagnosis, plant physiology. Entomologist: research on vegetable and fruit pests, biological control. Mycologist: diseases of pepper, citrus, vegetables, cinchona. Botanist: new introductions, herbicide trials. Anakapalle. Sugar cane specialist: varietal, cultural and manurial trials, N nutrition. Kodur. Biochemist: fruit and vegetable canning, fruit juices, preserves, candied peel, dried products.

1411. MADRAS DEPARTMENT OF AGRICULTURE.

Reports on the work of the Agricultural Stations in the Madras Presidency for 1949-50, 1952, pp. 692.

Anakapalle and Gudiyattam Sugar Cane Stations: varietal and cultural trials, N nutrition, biochemical studies on ratoons. Coonoor Pomological Station: chiefly apple, plum, pear, peach, persimmon. Burliar Fruit Station: chiefly mangosteen, cinnamon, jack, durian, breadfruit, clove, cacao. Kallar Fruit Station: chiefly mangosteen and mandarin. Kodur Fruit Station: chiefly citrus and mango. Aduthurai Banana Station.

1412. MYSORE.

Annual Report of the Mysore Agricultural Department for 1946-47, 1950, pp. 402 [received 1952].

Botanical: Castor, sunflower, vegetables and coconut—variety trials; apple—stock and variety trials, manurial-irrigation experiments, root study, thinning experiments, keeping qualities; other fruits. Pests and

Diseases at Hessarghatta Fruit Research Station: Apple—collar rot, root rot, canker, *Cercospora*, rosette, *Hemiberlesia latania*, San José scale; peach—*Botryodiplodia persicae*, *Dacus* sp.; sapodilla—fruit and twig borers. *Chemical:* Sugar cane manurial trials. *Mycological:* Areca—*Phytophthora arecae* and *Ganoderma lucidum*; coconut—bacterial bud rot; jack fruit—rhizopus inflorescence decay. *Entomological:* Sugar cane—top borer larval parasites (*Elasmus zehntneri*, *Rhaconotus scirpophagae*, *Stenobracon nicevillei*), multiplication of *Trichogramma minutum*, a parasite on *Argyria sticticrasis* sugar cane stem borer; sapodilla—unidentified fruit and twig borers; coffee—*Xylotrechus quadripes*.

1413. NEBRASKA.

64th Annual Report of the Nebraska Agricultural Experiment Station for 1950, 1951, pp. 152, illus. [received 1952].

Horticultural Crops: Tomato varieties which will set fruit well in hot, dry weather; varieties of beans, squash and pumpkins, lettuce and onions; breeding and variety trials with strawberries and apples; apple intermediate stocks; mulching vines; effect of sprays on growth of apple trees; control of cherry leaf spot on sour cherries. *Plant Diseases:* Bean diseases; seed treatment of safflowers to control rust (*Puccinia carthami*); tobacco mosaic and ringspot transmission by the differential grasshopper (*Melanoplus differentialis*). *Insect Control Experiments:* Control of safflower moth (*Homoeosoma electellum*) on safflower and sunflower with lindane and DDT. *Chemurgic Research and Development:* The acreages, yields and future prospects of safflower, castor, sesame, perilla, flax, sunflower and mustard cultivation in Nebraska are discussed.

1414. NEBRASKA.

65th Annual Report of the Nebraska Agricultural Experiment Station for 1951, 1952, pp. 24.

This annual report is essentially a statistical report, and is much shorter than hitherto. Beginning with July 1952, the Station plans to initiate the publication of a quarterly to speed up the flow of information.

1415. NEW SOUTH WALES.

Annual Report of the N.S.W. Department of Agriculture for 1950-51, 1952, pp. 68, 6s. 3d.

Plant Industry Division: tobacco; sunflower; hops; vegetables—breeding, variety trials and hormone tests; herbicides—blackberry, briar, lantana, St. John's Wort, etc.; fertilizer experiments. *Horticultural Division:* citrus—drainage, insect control; bananas—disease control, destruction by hormone injections; pome fruits—sod culture, hormones for apple thinning, breeding, rootstocks; stone, dried, berry and miscellaneous fruits and nuts—variety trials, disease control. *Science Services Division:* biological and entomological—diseases and control; chemist—fungicidal residues, trace element investigations, nicotine content of tobacco, strontium toxicity in citrus, grape leaf scald. *Hawkesbury Agricultural College:* citrus sod culture and management. *Wagga Agricultural College and Experiment Station:* almonds, olives.

1416. NORTH CAROLINA.

Agriculture astride the Century, including *73rd Annual Report N. Carolina Agricultural Experiment Station for 1950*, pp. 31-83, illus. [received 1952].

This includes: *Tobacco:* Yield and black shank and wilt resistance trials, blue mould control, D-D fumigation against nematodes, control of soil erosion on tobacco land, weed control, irrigation, oil-water emulsion for sucker control, and light traps for hornworm moths. *Fruits and Vegetables:* The development of perfect-flowered grapes, the control of leaf spot and scorch on strawberries, control of apple insects, susceptibility of peaches to bacterial spot, bacterial wilt resistant tomatoes, cabbage maggot control, safe use of soil fumigants in successive years, actidione for powdery mildew control on squash, and mildew resistant cantaloupe varieties.

1417. OVERSEAS FOOD CORPORATION.

Annual Report of the Scientific Department, Overseas Food Corporation for 1949-50, Part II. Kongwa, 1951, pp. not serially numbered.

Groundnuts are the main crop but work on sunflower, safflower, castor and *Hibiscus esculentus* is recorded. *Safflower:* variety and yield trials. *Castor:* planting date trials, *Hibiscus esculentus:* variety trial.

1418. SCOTTISH SOCIETY FOR RESEARCH IN PLANT BREEDING.

Report (abridged) by the Directors to the Annual General Meeting, July 1952, Corstorphine, Edinburgh, 1952, pp. 33.

Swedes: yield trials, strain AFT, early and late selection, clubroot resistance. *Kales:* unthinned sowings, transplanted kale trials. *Other brassicas:* inception of investigation of whole genus.

1419. SURINAME.

Verslag Departement van Landbouw, Veeteelt en Visserij, Suriname, over de jaren 1946, 1947, 1948. (Annual Report of the Dutch Guiana Department of Agriculture for 1946, 1947 and 1948), pp. 67 [received 1952].

Export and production figures of the principal crops. Citrus propagation, manuring and pruning trials. Trials with Bermuda onions on various soils. Analysis of the rotenone content of derris. Analysis of coconut leaves attacked by *Castnia daedalus* and of healthy leaves.

1420. TEXAS.

Report on Agricultural Research of the Texas Agricultural Experiment Station for the year ending 31 August 1950, pp. 71 [received 1952].

Flowers and woody ornamentals: Variety trials and tests of structures other than the conventional glasshouse for forcing chrysanthemums and other flowers. *Fruits and nuts:* Various field studies on peaches, plums, strawberries, apples, grapes, citrus and pecans. *Vegetables:* Variety and fertilizer trials; electric hotbeds; processing and refrigeration. *Irrigation and drainage:* Lettuce and orchards. *Insect Control:* Pecan aphids and mites; vegetable insects (serpentine leaf miner, bean leaf hopper, white flies on eggplants, red spider mites on cucurbits, onion thrips); citrus (red spider mite and

Californian red scale). *Fungal diseases*: Storage diseases of onions, foliage and nut diseases of pecans, citrus root nematode, resistant tomatoes, downy mildew-resistant cantaloupes. *Herbicides for woody and herbaceous weeds*: 2,4,5-T and 2,4-D.

1421. WÄDENSWIL (KOBEL, F.).

Jahresbericht 1949-1951 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. (Annual Report of the Wädenswil horticultural research station for 1949-51.)

Landw. Jb. Schweiz, 1952, 66: 561-699, bibl. pp. 8.

I. History: reorganization (1942) and research problems of the research station. II. (1) *Breeding and Physiology*: (a) Breeding and selection of apples, vines, strawberries, onions, beans, primulas and hydrangeas*; (b) the rooting of fruit tree and vine cuttings, the selection of non-poisonous *Primula obconica* plants; (c) leaf and wood composition in potted fruit trees, changes in the composition of stored fruit, methods of temperature measurement*. (2) *Plant protection*: (a) Fungicides and insecticides; (b) advisory service; (c) special investigations, entomology, diseases of fruit crops and vines, the spread of tobacco mosaic by nicotine dusts*, experiments with pathogenic soil fungi*, seed disinfection of vegetables, moulds on poinsettia inflorescences, mildews in glasshouses, lilac mildew, leaf-spot of celeriac. (3) *The chemistry and biology of beverages*: Wine and fruit juices. (4) *Fruit and vegetable utilization*: Storage trials with apples and pears, pear varieties for drying, fruit and vegetable varieties for deep freezing. (5) *Pomology*: Fruit tree rootstocks, training, nutrition, and biennial bearing, walnut grafting, an inventory of Swiss fruit varieties, phenological observations, pruning trials with apple and pear espaliers*, wound dressings, orchard costings, orchards on the research station, beekeeping. (6) *Viticulture and oenology*: Trials carried out at Wädenswil and elsewhere. (7) *Market gardening*: The effect of size of onion sets on yield and quality*, cultural trials with *Erica gracilis*, hydrangea and azalea, description of vegetable varieties.

1422. WAGENINGEN, INSTITUUT VOOR TUINBOUW-TECHNIEK.

Jaarverslag Instituut voor Tuinbouwtechniek, Wageningen, 1951. (Annual Report of the Institute of Horticultural Technique, Wageningen, for 1951), pp. 50, illus.

Several of the experiments reported are abstracted separately. Others deal with: Perforated double pots for tomatoes; glasshouse climate, heating systems, and air circulation; insulating covers for soil during steaming; electrically heated frames for raising endive; depth of electric cables for French bean culture; low tension electrical soil warming for mushroom; autumn production of strawberries with short day treatment, electrical soil warming and artificial light; electrical soil warming for forcing chicory; power and mist sprayers for hormone and fungicide applications to fruit trees; the use of finely chopped prunings as orchard mulch; and tests on fruit and gherkin grading machines.

* See separate abstract.

1423. ZANZIBAR.

Annual Report of the Zanzibar Department of Agriculture, 1950, 1952, pp. 36, sh. 2/-, and supplement Results of field experiments, crop and stock records and other statistics, pp. 19, sh. 1/50.

Clove research: Die-back due to *Cryptosporrella* sp. or *Diaphorhopsis* sp.; sudden-death associated with *Valsa* sp. Coconuts: Gumming disease caused by bug, *Theraptus* sp.

New or revived periodicals.

1424. FACULTY OF AGRICULTURE, UNIVERSITY OF TOKYO.

Records of Researches in the Faculty of Agriculture, University of Tokyo, 1950/51, No. 1, pp. 99.

The Records of Researches takes the place of the Journal of the College of Agriculture, the publication of which was suspended during the war. The new periodical will not, however, publish papers in full, but will be restricted to abstracts of papers published by members of the Faculty in other journals. The first number contains 210 abstracts, all in English and mostly fairly full, on papers covering a wide range of agricultural sciences.

1425. I.N.E.A.C.

Bulletin d'Information de l'Institut National pour l'Étude Agronomique du Congo belge, 1952, Vol. 1, Nos. 1/2, pp. 144, issued in one outer cover with the Bulletin agricole du Congo belge.

Hitherto l'Institut National pour l'Étude Agronomique du Congo belge (I.N.E.A.C.) has published the results of its work only in the form of several series of separates. The new Bulletin d'Information brings together papers on various agricultural and horticultural subjects written in an essentially practical manner, as well as condensed versions or extracts of technical papers published elsewhere. Appearing at first quarterly, it is hoped soon to issue 6 numbers each year. These will be bound jointly with the Bulletin agricole du Congo belge.

1426. JEWISH AGENCY FOR PALESTINE.

Ktavim (Records of the Agricultural Research Station).

Rehovot, Israel, 1950, Vol. 1, pp. 82 (English), plus pp. 352 (Hebrew).

The Agricultural Research Station at Rehovot in Israel is too well known to need an introduction, but hitherto the results of much of the research undertaken there has been published in a variety of journals. The publication of this first volume of the records of the station suggests that in future much of the work done there will be reported in the one periodical. The first volume contains 17 papers, published in Hebrew but with detailed English summaries, and of these 8 are concerned with horticultural crops or the pests of these crops.

1427.

Noted.

a AMSTERDAM. ROYAL INSTITUTE FOR THE TROPICS.

Een en veertigste Jaarverslag Koninklijk Instituut voor de Tropen, Amsterdam 1951. (41st A.R. Royal Institute for the Tropics, Amsterdam, 1951), 1952, pp. 67.

For a fuller account of the work of the Tropical Products Department, see H.A., 22: 4520.

- b BASUTOLAND.
A.R.s Dep. Agric. Basutoland for 1950 and for 1951, pp. 25 and 33 [received 1952].
- c BRITISH HONDURAS.
A.R.s British Honduras Dep. Agric. for 1949 and for 1950, pp. 11 and 15 [received 1952].
- d CANADA.
35th A.R. National Research Council of Canada for 1951-52, being *N.R.C. No. 2780*, 1952, pp. English 46, French 50.
Applied biology: possible role of maleic acid in photosynthesis.
- e CENTRALE ORGANISATIE VOOR TOEGEPAST-NATUURWETENSCHAPPELIJK ONDERZOEK.
Verslagen over 1950 van het Instituut voor Toegepast Biologisch Onderzoek in de Natuur, Oosterbeek. (A.R. Institute for Applied Biological Research in Natural Science, Oosterbeek, for 1950), 1951, pp. 17, being *Meded. Inst. toegep. biol. Onderz.* 11.
- f LIEBEFELD-BERN (GISIGER, L.).
Bericht über die Tätigkeit der Eidg. Agrikulturchemischen Anstalt Liebefeld-Bern im Jahre 1951. (*A.R. Liebefeld-Bern Research Station for Agricultural Chemistry, Switzerland, for 1951.*)
Landw. Jb. Schweiz, 1952, 66: 755-80, bibl. 17.
- g NEW ZEALAND.
Second Interim Report of the Inter-departmental Committee on Utilization of Organic Wastes, 1951, pp. 42, reprinted from *N.Z. Engng.*, 1951, 6, Nos. 11 and 12.
Includes composting of town refuse.
- h NORTHERN RHODESIA.
A.R. Northern Rhodesia Dep. Agric. for 1951, 1952, Lusaka, pp. 27, 1s.
- i TANGANYIKA.
A.R. Government Chemist, Tanganyika, for 1951, 1952, pp. 10, 1s.
Studies noted on coffee black tip (nutritional) disease.

